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BALLARD (J. C.) & DEZEEUW (D. J.). **Spartan Rock—a new Fusarium wilt resistant Muskmelon.**—*Quart. Bull. Mich. agric. Exp. Sta.*, **40**, 4, pp. 822–824, 1 fig., 1958.

Spartan Rock, resistant to *Fusarium oxysporum* f. *melonis* [cf. **35**, p. 266], was selected from the F_8 generation from Minnesota 10–38 × Howell Honey Rock, after backcrossing F_1 & F_2 to Honey Rock.

PETZER (C. F.). **Leaf spot disease of Muskmelon caused by Pleospora herbarum (Pers.) Rabh. (conidial stage Stemphylium botryosum Wallr.).**—*S. Afr. J. agric. Sci.*, **1**, 1, pp. 3–24, 2 pl., 2 graphs, 1958. [Afrikaans and French summaries.]

Studies at the Stellenbosch-Elsenburg College of Agriculture on a leaf spot disease of Hales Beet muskmelons, reported in the Western Cape Province in Feb. 1950, are described. Small, water-soaked lesions appear, sometimes profusely, on the older leaves towards mid-season. The centres of the spots turn yellowish and about 2 days later, while still enlarging (to ½ in. or more diam.), become light brown, a dark brown centre eventually being surrounded by a yellow zone 1–2 mm. wide. With high humidity at 25–30° C. the younger leaves also become spotted, marginally brown, and may generally be crumpled. The petioles may shrivel, older leaves fall, and great losses from sun scald result, but growing petioles, shoots, and young fruit are not attacked until they have died after premature defoliation.

Isolations from infected material gave the conidial state of *P. herbarum* [cf. **30**, p. 486; **35**, p. 21], *S. ilicis*, *Alternaria circinans*, and a number of saprophytes. Pathogenicity experiments demonstrated that *P. herbarum*, the nomenclature of which is discussed, was the most virulent of the 3 fungi, cultures from ascospore isolates proving more pathogenic than conidial. It remained viable for over 3 yr. in the soil. Infection by it was favoured at 25°, higher temps. encouraging the 2 less virulent fungi. Experimental inoculations with the 3 fungi indicated that only the leaves of muskmelons are susceptible. No muskmelon var. tested was resistant to *P. herbarum*, but cucumbers showed some resistance, and pumpkins were very resistant.

On the basis of a preliminary experiment dusting with zineb is recommended provisionally, together with seed treatment and phytosanitary measures.

BURTON (C. L.) & DEZEEUW (D. J.). **Studies on transmission of Verticillium wilt of Eggplant in Michigan.**—*Plant Dis. Reptr*, **42**, 4, pp. 427–436, 4 fig., 1958.

From laboratory, greenhouse, and field experiments at Michigan State University it is concluded that seed transmission of *V. albo-atrum* is extremely unlikely in eggplant.

LEHMAN (S. G.). **Physiologic races of the downy mildew fungus on Soybeans in North Carolina.**—*Phytopathology*, **48**, 2, pp. 83–86, 1 fig., 1958.

Four new races of *Peronospora manshurica* described from N. Carolina State College, Raleigh [cf. **33**, p. 275], are designated 3A, 5, 5A, and 6. The soybean vars. Mukden, Richland, Illini, Roanoke, Acadian, C.N.S., Ogden, Palmetto, Woods Yellow 1, and S-100 are proposed as differentials to distinguish all the races so far known in the U.S.A.

KAUFMANN (M. J.) & GERDEMANN (J. W.). **Root and stem rot of Soybean caused by Phytophthora sojae n.sp.**—*Phytopathology*, **48**, 4, pp. 201–208, 1 fig., 1958.

Isolates of a *Phytophthora* sp. responsible for root and stem rot of soybean [**36**, p. 373] in Illinois, Ohio, and N. Carolina [**35**, p. 503] are referred to a new species, *P. sojae* Kaufmann & Gerdemann. A similar disease in Missouri, Indiana, and Ontario (Canada) [**37**, pp. 205, 437] is believed to be due to the same species. In Illinois stem rot is the predominant symptom.

Of 8 inoculation techniques used, the most effective were: (1) the use of soil infested with the fungus grown on cornmeal sand medium or whole oats; (2) insertion of mycelial fragments into a slit in the hypocotyl; both distinguished susceptible from resistant varieties very effectively. Tested on a number of leguminous crops and cereals the fungus proved slightly pathogenic to lucerne seedlings and very slightly so to sweet clover, but to none of the others. The taxonomy and cultural characters in comparison with *P. megasperma* and *P. cactorum* [**37**, p. 372] are treated in detail. The pathogen is closely related to *P. megasperma*, being differentiated only by its less rapid growth rate in culture, its smaller oogonia (28·3–45·8, av. 37 μ) and oospores (19·2–38·3, av. 31 μ), deep colour reaction with chlorzinc iodide, and its pathogenicity to soybean.

BENEDICT (W. G.) & HILDEBRAND (A. A.). **The application of chromatographic methods to a study of the susceptibility of Soybean to stem canker.**—*Canad. J. Pl. Sci.*, **38**, 2, pp. 155–163, 2 graphs, 1958.

At the Canada Dept Agric., Harrow, Ontario, in an attempt to discover the mechanism by which soybeans become less susceptible to infection by *Diaporthe phaseolorum* var. *caulivora* [**37**, p. 199] with advancing maturity, 18 amino compounds in stem bark hydrolysates were identified by chromatography. Each compound increased in concentration with growth of the plant, as did the total N.

NEMLIENKO (F. E.) & KULIK (T. A.). Роль насекомых в распространении семядольного бактериоза Сои. [Insects as carriers of cotyledon bacteriosis in Soybean.]—Вестн. сельск. Науки [*J. agric. Sci., Moscow*], *1958*, 5, pp. 129–131, 1958. [English and German summaries.]

At the All-Union Scientific Research Institute of Maize, Moscow, in 1955–57 *Carpocoris fuscispinus* were caged on young soybeans in small parchment bags. The plants exposed to insects in mid-Aug. were injured and showed very high infection by bacteriosis [? *Pseudomonas glycinea*: cf. **5**, p. 591] (up to 95·1%), whereas those exposed in the 1st half of Sept. were not injured and bacteriosis incidence was 3%. Dusting with hexachlorane after bean formation reduced the insect population to 50% and bacterial infection was considerably less.

GARREN (K. H.) & DUKE (G. B.). **The effects of deep covering of organic matter and non-dirting weed control on Peanut stem rot.**—*Plant Dis. Reptr*, **42**, 5, pp. 629–636, 3 graphs, 1958.

In further investigations at Holand, Virginia [cf. **37**, p. 65], avoidance of soil contact with the above-ground parts of groundnut plants gave better control of *Sclerotium rolfsii* than did the deep burial of organic matter before planting, though in a heavily infested field deep covering reduced disease incidence by about 50%. Both practices increased yields, quality being little affected though usually higher after deep covering.

RAHEJA (P. C.) & DAS (G. P.). **Development studies in crop plants II.—Effect of cultural treatment on the incidence of Gram wilt.**—*Indian J. agric. Sci.*, **27**, 3, pp. 237–250, 2 graphs, 1957.

Work at New Delhi on the effect of spacing and date and depth of sowing on the

occurrence of gram [*Cicer arietinum*] wilt (*Fusarium orthoceras* var. *ciceri*) [cf. **34**, p. 348] showed the treatments to have no effect on early wilt which occurred 10–15 days after sowing. Incidence of late wilt, starting on 14 Mar., decreased with delayed sowing [cf. **23**, p. 325], shallow seeding (2½ in. against 5 in.), and wider spacing (10, 15, and 20 in. between rows). The sowing dates were: 27 Oct. and 10 and 24 Nov.

Lukashevich (A. I.). Меры борьбы с аскохитозом Нута. [Control measures against ascochytosis of Chick pea.]—Вестн. сельск. Науки [*J. agric. Sci., Moscow*], *1958*, 5, pp. 131–135, 1958. [Russian and German summaries.]

In the steppe region of the Ukrainian SSR chick pea [*Cicer arietinum*] is attacked by *Ascochyta rabiei* [map 151], especially in warm weather with frequent rains. The disease, which is seed-borne and can also spread from plant debris after harvest, was checked by sowing later in Apr. and at 3 cm. depth. Application of K (at 45 [? kg./ha.]) before sowing in 1951 gave only 7·5% diseased plants compared with 18% with no fertilizers. Dusting dry seeds with 2:1,000 and previously soaked seeds with 1:1,000 granosan gave higher germination and less infection, especially at the lower rate. Treatment immediately before sowing gave 17·8% less infection than the untreated. Spraying the plants with S compounds (3% water suspension at 500–600 l./ha.) gave good control and increased yield from 31 to 82·8%.

Nemlienko (F. E.) & Lukashevich (A. I.). Агротехнические мероприятия против аскохитоза Нута. [Agrotechnical measures against ascochytosis of Chick pea.]—*Plant Prot., Moscow*, *1957*, 4, pp. 31–33, 4 fig., 1957.

In the Dnepropetrovsk region, U.S.S.R., *Ascochyta* [*rabiei*: see above] on chick pea [*Cicer arietinum*] was extremely severe in 1956, sometimes causing 100% losses. Experiments at the Sinel'nikovsky Experiment Station showed that cultural practices are more important for control of the disease than chemical ones. Harvesting should be early as the disease often develops late in damp weather. K fertilizers were advantageous.

Beck (B. D. A.) & Chant (S. R.). **A preliminary investigation on the effect of mosaic virus on Manihot utilissima Pohl. in Nigeria.**—*Trop. Agriculture, Trin.*, **35**, 1, pp. 59–64, 1958.

At the Dept Agric., Ibadan, Nigeria [cf. **37**, p. 203], observations of cassava var. No. 56160 (highly tolerant of the virus, but a poor yielder) over an 8-month period showed that primary infection by cassava mosaic virus [**15**, p. 701] reduced the yield by 34% at 6 months. There was a highly significant positive correlation between leaf area and yield of healthy plants but not of infected ones with symptom expression at its maximum, when there was also a significant difference in leaf area between healthy and infected plants. The C/N ratio in infected plants was higher, though percentages of carbohydrate and N were less [cf. **9**, p. 667], possibly owing to their more rapid breakdown indicated by the greater respiration rate of infected leaves in the dark than healthy.

Gandy (Doreen G.). **The investigation of some Mushroom disorders.**—*M.G.A. Bull., 1958*, 100, pp. 140–146, 1 fig., 1958.

From the Glasshouse Crops Research Institute, Littlehampton, the author reports that the symptoms seen on inspections (in S. and S.E. England) of outbreaks of soft rot resembling La France disease [**36**, p. 511] were: (1) death of the mushrooms before maturity, those affected assuming the colour and consistency of putty, becoming discoloured on handling, and shrivelled and mummified under dry conditions; (2) waterlogging of the tissues, particularly in the stipe, the whole of which

may become translucent, or with internal longitudinal streaks often surrounding a cavity; (3) absence of gills or veils; (4) deformities of the sporophore, which may finally resemble a drumstick; (5) poor development of the mycelial strands, particularly those connecting the sporophore with the vegetative mycelium; and (6) decreased cropping.

A number of experiments, in which sections of beds or whole trays were transferred to different buildings, indicated that disorders with similar symptoms do not necessarily respond in like manner to changes of environment. The causes of the disorders remain unknown.

STOREY (I. F.). **What is brown disease?**—*M.G.A. Bull., 1958*, 100, pp. 185, 187, 189, 191, 1958.

A study by the National Agricultural Advisory Service, Derby, in the E. Midlands, of brown stem disease of mushrooms on several farms, apparently distinct from La France disease [see above], which had occurred on one farm some years before, showed it to be present on shelf beds in patches, with severity increasing towards the centre; at its worst there was no growth or the mushrooms died before harvest. Common to all affected sporophores was the presence of water-soaked streaks in the internal tissue of the stipe, later becoming visible as translucent areas extending from the base to the pileus. In some instances the flesh of the pileus was mottled pink near the junction with the stipe and immediately above the gills. On 1 farm the brown blotch bacterium (*Pseudomonas tolaasi*) [cf. **30**, p. 555] was isolated from severely but not from mildly affected mushrooms, and was assumed to be a secondary invader. No causative agent could be demonstrated in the spawn, casing soil, or compost and there was no reason to suspect a virus infection.

Cropping records from a severely affected farm showed that the trouble occurred particularly in the autumn, though present also in winter, and it was thought that spells of warm humid weather, hindering evaporation from the beds, were responsible. This conception was supported by experiments in which the disease was induced in healthy pot cultures by overwatering while restricting evaporation, and also by the improvement obtained in commercial houses following attention to ventilation. The author suggests that brown stem disease, La France disease, and 'Stoller's disease' [**32**, p. 60] are all caused by interference with evaporation.

HUGHES (D. H.). **Discoloration findings noted—longer shelf-life is the goal.**—*M.G.A. Bull., 1958*, 99, pp. 86–92, 2 fig., 2 graphs, 1958. [Reprinted from *AMI Mushroom News*, Jan., 1958.]

Speaking at the University of Delaware, U.S.A., the author outlined the problem of discoloration, or 'browning', in mushrooms and the progress made in practical measures to counter it. Browning results from the action of polyphenol oxidase in the tissues and is augmented by both bruising and increased temperatures. Present chemical measures against it include the use of reducing washes (ascorbates, sodium bisulphite or sulphite) and thiol compounds; the action of the reducing agents may be more effective in the presence of additional substances such as salt. The opt. temp. for a bisulphite wash is 55° F. The use of adenosine triphosphate, nitrogen packaging, and anti-enzyme systems are further possible means of keeping mushrooms white for 5 days or so under adverse temperature conditions.

It is important to remove the loose hyphal strands on the pileus, which easily break apart and initiate the browning process. This is done by suitable washing and the mushrooms may then be rapidly dried on an absorbent surface, a procedure which it is hoped to mechanize.

Chromatographic study of the amino-acid constitution of successive mushroom flushes showed the content of tyrosine, a substrate for polyphenol oxidase, to be high in the 1st flush and to fall almost to nil in the 5th, while the level of the other

18 acids concerned remained approximately constant. This may account for the poor storage quality of the 1st, and major, flush compared with subsequent flushes.

Bels-Koning (Mevr. H. C.) & Bels (P. J.). **Het gebruik van stoom in de Champignonkultur.** [The use of steam in Mushroom culture.]—*Meded. Dir. Tuinb.*, **20**, 8–9, p. 483, 1957. [English summary.]

With the rapid and widespread expansion of mushroom growing in the Netherlands comes the risk of fungal and insect pests. Most pathogens succumb to steam disinfection of the houses as practised in Canada, where a current of 1–3 atm. pressure is supplemented by 10–20 l. 40% formalin/640 cu. m. Within 3 hr. the temp. of the house rises to 50–65° C., which is maintained for 1 hr., followed by closing for at least 12 hr. before emptying. Just before starting a new crop after 4–5 days the house is again steamed but without formalin.

Goodman (R. N.). **The effect of pentachloronitrobenzene (PCNB) on Mushroom production.**—*Plant Dis. Reptr*, **42**, 4, pp. 444–446, 1 fig., 1958.

It is reported from the University of Missouri, Columbia, that PCNB at 250 p.p.m. or more applied to mushroom beds [cf. **36**, p. 373; **37**, p. 130] 24 hr. after casing delays production and limits yield. If applied after the 1st flush, up to 1,000 p.p.m. has no such effect. [Reprinted in *M.G.A. Bull., 1958*, 104, pp. 311-313, 1958.]

Nukumizu (T.), Ando (M.), & Dozono (Y.). **On improvement of 'Tanegoma' piece, a spawn for the cultivation of 'Shiitake', Cortinellus edodes S. Ito et Imai.**—*Bull. For. Exp. Sta., Meguro*, 105, pp. 19–34, 4 fig., 2 graphs, 1958. [Japanese. Abs. from English summary.]

The writers describe their improved 'Tanegoma' spawn, a wedge-shaped piece of wood, with a narrow groove in one side, inoculated with a pure culture of *C. edodes* [**33**, p. 335; **34**, p. 333]. The improvement reduced the incubation period, increased the quantity of good spawn produced, and gave a higher percentage of successful inoculations.

Branas (J.). **Sur le mode de transmission du court-noué.** [On the manner of transmission of court-noué.]—*Progr. agric. vitic.*, **75**, 12, pp. 265–271, 1958.

The author discusses the suggestion (*Vitis*, **1**, 4, pp. 237–256, 1958) that infectious degeneration of the vine (court-noué) [cf. **36**, p. 165; **37**, p. 200, *et passim*] is probably not transmitted by *Phylloxera* [*vastatrix* f. *radicicola*], and expresses the opinion that the disease, in the contagious form in which it is present in France today, did not exist there before the country suffered invasion by the insect, that it does not exist today in regions in which the *Phylloxera* is not found, that the insect plays a part in the spread and aggravation of the disease, and that there is no satisfactory evidence to challenge these views.

Hewitt (W. B.), Loomis (N. H.), Overcash (J. P.), & Parris (G. K.). **Pierce's disease virus in Mississippi and other southern States.**—*Plant. Dis. Reptr*, **42**, 2, pp. 207–210, 1958.

Evidence is presented that Pierce's disease [lucerne dwarf virus: map 262] (also recorded in Texas: *Yearb. Agric. U.S. Dep. Agric., 1953*, pp. 744–753) occurs on vine in Mississippi and Alabama, and in Georgia (vine and lucerne).

Hewitt (W. B.). **The probable home of Pierce's disease virus.**—*Plant Dis. Reptr*, **42**, 2, pp. 211–215, 1958. [28 refs.]

The records of Pierce's disease [lucerne dwarf virus: see above and below] in California and probable occurrences in the past in other States are reviewed. In view of the reactions of *Vitis* spp. to the disease, which are outlined, the writer

suggests that as the only known resistant species are native to the Gulf States, the disease probably originated in that area.

STONER (W. N.). **Field symptoms indicate occurrence of 'Alfalfa dwarf' or 'Pierce's disease' virus in Rhode Island.**—*Plant Dis. Reptr*, **42**, 5, pp. 573–580, 4 fig., 1958.

Symptoms similar to those of alfalfa [lucerne] dwarf virus [see above] were found on vine and lucerne in 1956 and 1957. *Draeculacephala antica* was consistently associated with both crops and tests are in progress to determine if it is a vector.

SANTILLI (V.). **Zoospore morphology of the California strain of Plasmopara viticola.**—*Nature, Lond.*, **181**, 4613, pp. 924–925, 1 fig., 1958.

At the Henry Shaw School of Botany, Washington University, St. Louis, Missouri, zoospores from sporangia of *P. viticola* [**36**, p. 678] on leaves of *Vitis californica* and *V. girdiana* measured $11{\cdot}7 \times 9{\cdot}5\,\mu$ in electron micrographs; the short flagellum, $10{\cdot}7\,\mu$ long, bore cilia $1\,\mu$ long, but there were none on the long flagellum ($19{\cdot}2\,\mu$). In both flagella long parallel strands of dense material were enclosed in a less dense matrix.

LAFON (J.), COUILLAUD (P.), & GAY-BELLILE (F.). **Sur la technique des brouillards légers aqueux à 30 litres de liquide par hectare.** [On the technique of fine aqueous mists at 30 litres of fluid per hectare.]—*C. R. Acad. Agric. Fr.*, **44**, 5, pp. 211–221, 1 graph, 1958.

In 1957 Ugni Blanc vines at the Station Viticole, Cognac, Charente, France, were treated 6 times with a fine mist from a new type of portable mist blower delivering 30 l. of a mixture containing 33·3% Cu (as oxychloride), 13·4% zineb, and adjuvants, applied at a conc. of 15% (=4·5 kg. active material/h.). Corresponding plots were sprayed in the ordinary way with a similar mixture without adjuvant to give the same dosage and with Bordeaux mixture at 2% and 0·5%.

On 23 Aug. the percentages of grapes with brown rot lesions of downy mildew [*Plasmopara viticola*] were: for copper-zineb, ordinary spraying, 6·6; fine mist, 6; 2% Bordeaux, 20·8; and 0·5% Bordeaux, 51·3. On 26 Oct. the weights of leaves/vine for these treatments were, respectively, 0·655, 0·957, 0·677, and 0·398 kg., demonstrating clearly the superiority of the fine mist.

Copper analyses showed that application of a fine spray does increase the Cu deposit on the upper surface of the leaf, but on the lower surface it is 4 times greater than with ordinary spraying and is about twice as much as on the upper surface. The paper ends with a review of recent progress in the technology of pneumatic spraying, with special reference to results in Switzerland.

BRANAS (J.). **Les broussins.** [Tumours.]—*Progr. agric. vitic.*, **75**, 2, pp. 27–30, 1 fig., 1958.

A brief account is given in popular terms of excrescences which appear on vines after winter frosts and sometimes after hail. They follow wound infection by *Agrobacterium tumefaciens* [cf. **31**, p. 543; **35**, p. 817] from the soil. The tumours are malignant, but dry up during the year of their formation; the girdling which they induce causes the death of the organ bearing them.

Report of the Rothamsted Experimental Station for 1957.—316 pp., 1 pl., 1 map, 1958.

Reporting on the work of the Plant Pathology Dept (pp. 104–123) [cf. **36**, p. 811], F. C. BAWDEN refers to work in collaboration with N. W. PIRIE [cf. **37**, p. 79] which showed that nucleic acid obtained from tobacco mosaic virus could be infective, but recent work on the synthesis of infective particles by the recombination

of non-infective nucleic acid with virus protein [cf. **36**, p. 733] was not confirmed. In the Report of the Biochemistry Dept N. W. PIRIE (with F. C. BAWDEN) notes (p. 101) that whereas the infectivity of the virus is difficult to destroy, various sources of ribonuclease inactivated the more infective fragments (mostly nucleic acid) obtained by disrupting the virus with phenol or detergents with a readiness paralleling their enzyme activity. Saliva has ribonuclease activity and inactivated fragments of the virus even at 1/1,000.

F. C. BAWDEN and A. KLECZKOWSKI found that when the phenol method of preparing infective preparations of nucleic acid from tobacco mosaic virus was applied to potato virus X it gave infective solutions but the usual virus particles could not be detected in them by electron microscopy or serological tests. Technical problems studied by H. L. NIXON during electron microscope examination of virus preparations, and work by B. KASSANIS, L. BROADBENT, R. S. BADAMI, and M. CHESSIN on virus multiplication and inactivation by heat treatment [cf. **37**, p. 170] and by thiouracil and gibberellic acid are outlined.

Observations by L. BROADBENT and G. D. HEATHCOTE showed that aphid infestation was greater than in any year since 1940; during 10 days at the end of May, 5,205 aphids were trapped at Harlow, more than double any previous comparable record. B. KASSANIS reports a better yield from 25 potato tubers free from paracrinkle virus [cf. **37**, p. 108] than from comparable infected tubers. MARION A. WATSON found that transmissions from tobacco plants infected simultaneously by potato viruses C and Y [cf. **36**, p. 551] to Majestic potato demonstrated a range of variants differing from both C and Y. The ability of different isolates to be transmitted by *Myzus persicae* differed and was decreased by passage through Majestic. R. S. BADAMI and B. KASSANIS obtained an unusual strain of potato virus Y from *Solanum jasminoides* from India, which in Majestic and other potato vars. closely resembled the Rothamsted stock of potato virus C, but unlike it was readily transmitted by *M. persicae* after it had been separated from 2 other viruses present in *S. jasminoides*. These decreased the multiplication of the virus Y strain and its aphid transmissibility and seem not to have been described before; they were not serologically related to virus Y or to one another; one was transmitted (rarely) by *M. persicae*.

MARION A. WATSON and T. MULLIGAN observed that symptoms suggestive of cereal [barley] yellow dwarf virus [**36**, p. 812] were widespread in cereal crops, but the virus was not often recoverable. No isolate from naturally infected plants was as virulent as some reported from U.S.A. All the isolates were transmitted by *Rhopalosiphum padi*, *Sitobium granarium*, and *M. circumflexus* and less effectively by *S. fragariae*.

In work by MARION A. WATSON and J. T. SLYKHUIS wheat striate mosaic virus [loc. cit.] was transmitted by all forms and stages of *Delphacodes pellucida* after feeding for 9–24 hr. After leaving infected plants the insects were unable to transmit for 7–30 days, but after that most could infect in 24 hr. and about 1 in 50 in only 20 min. They remained infective for weeks or months. Wheat striate mosaic virus infected all wheat, oats, and barley vars. tested, as well as rye and rye grass [*Lolium*], but not maize or rice. It is not yet economically important.

T. MULLIGAN confirmed the transmission of rye grass mosaic virus [loc. cit.] by an eriophyid mite (*Abacarus hystrix*). Symptoms were more evident in inoculated Italian [*L. italicum*] than in perennial [*L. perenne*] types. The virus also infected *Festuca pratensis*, *Cynosurus cristatus*, and *Poa annua*, the last-named a useful test plant showing a bright mosaic and yellowing of the leaf tips. The virus contained rod-shaped particles, 400 × circ. 20 mμ. B. KASSANIS and J. T. SLYKHUIS ascertained that the seed-transmitted barley false stripe virus [loc. cit.] has stiff particles circ. 150 × 30 mμ; it infected summer spinach, causing a bright mottle and ring pattern.

J. W. Blencowe found *M. persicae* breeding freely in the spring on wild beet, almost certainly after over-wintering on it [**37**, p. 613]. Marion A. Watson states that the 'water mottle' virus [**35**, p. 869] from wild beet appears to be related to beet mosaic virus. The 2 viruses can multiply in the same plant, but the necrotic local lesions of the former do not develop when it is inoculated to leaves with symptoms of beet mosaic virus. The type of symptom varies widely with the genetical constitution of the beet. Water mottle virus was transmitted by *M. persicae* and *M. ascalonicus*, but much less readily than beet mosaic virus.

Under Mycology further studies by J. M. Hirst and O. J. Stedman on the early phases of epidemics of potato blight (*Phytophthora infestans*) are noted [**37**, p. 302]. For the first time in the open *P. infestans* was observed to invade stems from 2 naturally infected tubers, as well as from 2 artificially infected. D. H. Lapwood found that the common race of *P. infestans* was 4, but the hypersensitive vars. Orion (R_1 gene) and Pentland Ace (R_3) became infected early in Sept. by races 1,4 and 3,4, respectively. Commercial potassium silicate (66° TW), applied to tomato plants at 5% (which was phytotoxic) or less a few days or hours before inoculation with *P. infestans*, failed to prevent blight. G. A. Salt found that a 10% thiram dust applied to potato 'seed' and the furrow at 150 lb./acre reduced the disease rating (DR) by *Oospora pustulans* [**36**, p. 720] from 54 to 41% at Rothamsted and from 48 to 21% at Woburn. It was ineffective in the furrow only and on the seed at Rothamsted, but at Woburn seed treatment reduced the DR to 19%; a 20% PCNB dust applied similarly at 300 lb./acre decreased the DR at Rothamsted (19%) and at Woburn (34%), and also when applied only to the seed at Woburn (19%). These treatments also decreased eye infections and the incidence of skin-spot lesions in storage. In the clamp skin spot developed on 74% of the tubers from untreated plots, but on only 28% of those treated with thiram and on 39% with PCNB.

Mary D. Glynne and L. J. Cock observed that the 1957 wheat crops following wheat or barley in 1956 averaged 78% straw infection by *Cercosporella herpotrichoides* and 11% root infection by *Ophiobolus graminis* in July, but only 22% and 0·3% infection resulted where wheat or barley in 1955 had been succeeded by potatoes or [broad] beans in 1956. The effects of weed control on a non-rotated wheat plot were offset by severe take-all in a weed control experiment by G. A. Salt. The effects of temperature changes on different aspects of sporulation and lesion development by *C. herpotrichoides in vitro* and on seedlings are noted.

Mary D. Glynne and G. A. Salt (pp. 231–241) review past investigations at Rothamsted and elsewhere on eyespot (*C. herpotrichoides*) of wheat and barley [cf. **37**, p. 154].

Tests were made by E. W. Buxton of the pathogenicity of spores of race 1 of *Fusarium oxysporum* f. *pisi* after exposure to root exudate from Alaska pea plants, resistant to this race [**36**, p. 629]. Spores kept for 14 days in concentrated exudate, or transferred every 48 hr. to a series of increasing concentrations of exudate for 14 days, were inoculated to the susceptible pea var. Onward and to Alaska. After 26 days 84% wilt was recorded in Alaska inoculated with spores from the concentrated exudate and 100% in plants inoculated with spores exposed to higher concs. Alaska, inoculated with spores kept in sterile water, did not wilt. Similar results were obtained whether the spores germinated in the exudate (incubation at 25° C.) or were in a resting state (at 4°). Not only did the exudate-treated spores wilt Alaska but their ability to wilt Onward was reduced from 100% to a mean of 73%. After exposure to the products of *Streptomyces albido-flavus F.o.* f. *pisi* grew in solutions which previously had inhibited growth. New pea vars. from New Zealand, Blue Prussian, Greenfeast, and Resistant Onward [**37**, p. 127] had, respectively, 28, 35, and 46% plants wilted, against 100% for English Onward, which wilted 3 weeks earlier. D. A. Perry found that when *F.o.* f. *pisi* and *F.*

solani f. *pisi* were inoculated together to Onward peas wilt occurred more slowly and was less severe than when *F.o.* f. *pisi* was inoculated alone.

Tests by I. MacFarlane showed that almost all plants of the long radish var. Woods Frame developed symptoms when inoculated with *Plasmodiophora brassicae*, whereas the Red Forcing turnip radish was highly resistant.

Seed treatments by L. F. Gates of sugar beet with fungicides increased the stand of seedlings by about 40%; ethyl mercury phosphate solution gave 10% more seedlings than dry organo-mercury preparations. C. E. Cornford found that sprays containing 0·1 and 0·5% streptomycin, applied 1 day before inoculation, controlled *Peronospora schachtii* on beet seedlings in the greenhouse, but were less effective when the inoculations were made 5 or 7 days after spraying. *Pleospora betae* [cf. **25**, p. 55] was found for the first time in England at Dunholme, Lincs., in Oct. 1957 on wild beet (*Beta vulgaris*). The connexion between it and *Phoma betae* was confirmed.

The Report of the Soil Microbiology Dept includes an account of studies by R. M. Jackson on fungistasis [**36**, p. 726] in soil (pp. 80–81). The lowest inhibition of germination of a test fungus [unspecified] was produced by soil from a more acid plot and the highest from less acid. Evidence from soil-sterilization experiments suggested that aerobic, spore-forming bacteria may cause natural soil fungistasis.

A method devised by A. H. McIntosh of the Insecticides and Fungicides Dept (pp. 150–151) for making cavity slides from perspex is described. In further studies on the toxicity of fungicides to spores of *Botrytis fabae* all the Hg salts gave positive temperature coefficients of fungitoxicity. The loss in strength of $HgCl_2$ solutions (0·0005% Hg) kept in small perspex pots was about 6% in 24 hr.

Thirty-eighth Report of the National Institute of Agricultural Botany, Cambridge, 1957.—56 pp., 1958.

In the mycological section (pp. 19–21) [cf. **37**, p. 2] it is stated that in June and July wheat yellow rust [*Puccinia glumarum*] became widespread, causing heavy infection in susceptible vars. It was unusually prevalent on Cappelle Desprez, susceptible to race 2b. Only races 2b and 8b were identified from samples collected in various localities and 21 and 40 of black rust [*P. graminis*] from S.W. England. Preliminary studies on cereal mildew [*Erysiphe graminis*] indicate that it considerably reduces the yield of spring barley.

The Potato Branch reports (pp. 21–24) that stem-end blackening results from a complex formed between ortho-di-hydroxy phenols, most probably chlorogenic acid, and Fe. The intensity of discoloration depends on the conc. of these substances, the pH, and the presence of citrate ion, which competes with the phenols for Fe. In seed plots Ulster Beacon and Arran Viking developed potato virus Y symptoms unusually early and Ulster Supreme became slightly infected for the first time. A virus related to the soil borne beet ringspot virus [cf. **37**, p. 463] was isolated from a Gladstone plant. From 10 foreign vars. Ackersegen (also with a high degree of 'field' resistance), Ås, Canso, Cayuga, Cherokee, Fruhperle, and Panther were partly resistant to 6 races of *Phytophthora infestans*, while Ontario, Seneca, and Kathadin were susceptible to all. Of 38 blight samples collected the fungus in 32 was identified as race 4, in 6 (from Ulster Torch) as 1,4. *P. infestans* produced oospores in both liquid and solid synthetic media, but none in pea meal agar.

Annual Report 1956, Glasshouse Crops Research Institute.—139 pp., 2 pl., 2 diag., 13 graphs, 1 plan, [1958].

In the Plant Physiology section [cf. **37**, p. 201] A. J. Cooper presents (pp. 39–47) a critical review [66 refs.] of the literature dealing with blotchy ripening and allied disorders of the tomato [cf. **36**, p. 517].

In the Plant Pathology section (pp. 110–124) P. H. Williams and Judith Hack describe the application of thin layers of unsterilized soil to slides coated with water agar and inoculated with a spore suspension of *Didymella lycopersici* [cf. **37**, p. 337]. The spores disappeared in 5 or 6 weeks; if they germinated, the germ-tubes soon ceased to grow. On similar autoclaved slides spore germination was normal and the fungus grew and sporulated. Continued observation of cover slip cultures gave no suggestion that the mycelium was destroyed by bacteria or other fungi, nor could toxic effects of the soil solution on spores of *D. lycopersici* be demonstrated. When 1% glucose was added to unsterilized soil 1 month before inoculation with spores the number that survived (18%) was approximately the same as in unamended soil, but with 5% glucose about 66% survived. When various fungi, bacteria, and actinomycetes were added singly and in combination to sterilized soil, a known number of spores of *D. lycopersici* being added at intervals up to 9 months, no organism or combination of organisms had any effect on germination and growth, although when a suspension of unsterilized soil or 5% of unsterilized soil was added spore survival was reduced to 50% in 2 weeks and after 9 months inhibition was complete. Soil steamed to kill fungi, but not all bacteria and actinomycetes, also remained toxic to spores of *D. lycopersici*.

Olwen M. Stone found the best containers for growing cucumber seedlings for work on cucumber mildew [species not yet identified] to be large tubes, $10 \times 1\frac{1}{2}$ in.; infection of the cotyledons gave the best results. A collection of Cucurbitaceae, from as many sources as possible, was tested by inoculation; only *Luffa acutangula* and *L. aegyptica* were completely resistant; *Ecballium elaterium* was only slightly infected in the tubes and not at all in the greenhouse. As the oidia of cucumber mildew do not survive apart from host tissue for more than a few days it may overwinter on another host. Unrelated plants were inoculated with mildew from cucumber and 9 spp., including flax and *Ricinus communis*, became infected. Cucumber was infected with the mildews from naturally infected *Sonchus* sp. (*Erysiphe cichoracearum*), *Senecio vulgaris*, and *Ranunculus repens* (*E. nitida*). Mildews, two identified as *E. cichoracearum* and *Sphaerotheca fuliginea*, from 8 other hosts failed to infect cucumber. No definite indication of the identity of the fungus causing cucumber mildew has so far been obtained. The state of the host plant appears to influence the production of the perfect state. Using a Hirst spore trap no mildew spores were secured from late Mar. to late May.

Chrysanthemum cuttings planted in tubes of vermiculite or sand developed mildew after a short time, though no disease was apparent when the cuttings were taken. This suggests that this mildew may grow vegetatively on the shoots and produce spores only under favourable conditions. In inoculation tests the chrysanthemum mildew infected chrysanthemums but not annual *Chrysanthemum* spp. though these were infected by cucumber mildew.

Describing investigations into carnation wilt diseases (*Verticillium cinerescens*, *Fusarium roseum* (sensu Snyder and Hansen), *F. oxysporum* f. *dianthi* [*F. dianthi*], and *Erwinia* sp., Marion H. Ebben states that *F. roseum* by itself frequently causes wilt. Actidione in agar completely inhibited the growth of *V. cinerescens* and greatly retarded that of *F. roseum*. For surface sterilization $HgCl_2$ was preferable to calcium hypochlorite, which does not kill the spores of *Chaetomium* spp. Secondary infection of wilted plants commonly occurs, especially after cortical rotting by *F. roseum*. The slow development of wilt organisms within the plant handicaps prevention of the disease in carnations.

Doreen G. Gandy found that mycelium isolated from mushrooms affected by La France disease [**37**, p. 627] and similar disorders, even if able to grow in pure culture, may have an abnormally slow growth rate, is frequently pale buff instead of white, and sometimes lacks coarse mycelial strands radiating from the point of inoculation, or they are poorly developed.

Braconnier (R.) & Wilkins (V. E.). **Annual report 1957–58, European and Mediterranean Plant Protection Organisation.**—27 pp., 1 map, Paris, 142 Avenue des Champs-Élysées, 1958. [With French translation.]

This report [cf. **35**, p. 747] includes, *inter alia*, brief discussions on plant protection legislation, pests and diseases of stored produce, seed-borne diseases, and Mediterranean pests and diseases.

Démétriadès (S. D.), Zachos (D. G.), Papaïoannou (A. J.), & Constantinou (P. T.). **Rapport sommaire sur les principales maladies des plantes cultivées, observées en Grèce au cours de l'année 1956.** [Brief report on the principal plant diseases observed in Greece during the year 1956.]—*Ann. Inst. phytopath. Benaki*, N.S., **1**, 2, pp. 91–97, 1957.

In this report [cf. **37**, p. 132] the following are listed: *Septoria depressa* which seriously damaged lemon trees in the Peloponnese and on Poros, *Rhizoctonia crocorum* [*Helicobasidium purpureum*] on lucerne in the Kozani and Jannina areas, and *Fusarium oxysporum* var. *gladioli* on gladiolus at Kiphissia and Marathon.

Annual Report on the Department of Agricultural Research, Federation of Nigeria, for the year 1956–57.—48 pp., 1 graph, 1958. 9*d*.

In the section (p. 22) of this report [cf. **37**, p. 203] dealing with maize research R. H. Cammack states that a series of leaf spots, formerly attributed to *Cochliobolus heterostrophus* [cf. **37**, p. 159], may be due to *Helminthosporium sativum* [*C. sativus*]. Investigations were continued into a pellucid ring spot of unknown origin.

In the plant pathology section (pp. 29–34), investigations by S. R. Chant showed that white flies (*Bemisia* sp.) transmitted cassava mosaic virus [**37**, p. 627] even after 15 hr. starvation. When the insects were fed on the stem apices they were still capable of infection after 3 transfers. The virus proved to be persistent and the vector probably remains infective throughout its adult life. (G. S. Cotterill (p. 36) records that white flies from cassava can also breed on cotton, tomato, and *Euphorbia*.) Further attempts to transmit cassava mosaic mechanically failed. No reduction in the number of local lesions produced on *Nicotiana glutinosa* leaves occurred when tobacco mosaic virus was mixed with undiluted cassava sap. Experiments in heat therapy indicated that the virus is completely inhibited in the green stems, but is able to survive in a thick woody cutting. Green stems rooted after 14 days' growth are being subjected to 4 weeks' treatment at 37·5° C.

A *Phytophthora*, which from peculiarities in the structure of the sporangial wall must be regarded either as a new sp. or as a new var. of *P. parasitica*, was consistently isolated from Sierra Leone rough lemon stocks and later from Rangpur lime and sweet orange with gummosis disease by washing portions of the bark in tap water for 24 hr. and then placing them in eggplant fruits. As attempts to isolate from the original lesions on rough lemon stocks during the dry season were unsuccessful, it is concluded that the fungus dies out in the cambium during the hot weather. There were virtually no differences in the colony diam. in media of pH 5·4, 5·8, and 6·2, but no growth occurred at 4·8 or less.

J. M. Waterston records that at least 45% of the pineapple fruits picked at the beginning of the dry season were damaged. Fruitlet brown rot of undetermined origin had an average monthly incidence of 3·5% over a period of 28 months (0–10·8% in 9,391 fruits examined).

A Plant Quarantine Officer was appointed in Feb. 1957.

Annual Report of the Department of Agriculture, Tanganyika, 1956 (Part II).—106 pp., 1958.

In the section of this report [cf. **36**, p. 518] on diseases (pp. 13–17) M. H. Arnold

states that the use of mercurial seed dressings on a large scale to control bacterial blight of cotton (*Xanthomonas malvacearum*) [cf. **36**, p. 644] was considered but is not envisaged for the immediate future. The addition of dyes to several proprietary seed dressings to colour the seed as a precaution against poisoning was shown not to impair their effectiveness.

E. A. Riley reports the following new records for the Territory from Lyamungu (pp. 89–91): cotton wilt (*Verticillium dahliae*) [cf. **37**, p. 237], leaf spot of lucerne (*Cercospora zebrina*) [cf. **36**, p. 191], scab of tobacco (*Septomyxa affinis*) [cf. **29**, p. 144], and storage rot of gladiolus (*Penicillium gladioli*). The most serious disease of beans [*Phaseolus vulgaris*] locally is halo blight (*Pseudomonas* [*medicaginis* f.sp.] *phaseolicola*) [**35**, p. 164]. In the Northern Province it is generally considered that spraying with Cu fungicides does not provide adequate protection against coffee rust (*Hemileia vastatrix*) [cf. **37**, p. 513] either because spraying is at the wrong time or because Cu fungicides are ineffective against the local strains of the rust.

Of the coffee trees at Lyamungu affected by stem-pitting and decline [**36**, p. 643], selection N39 had swelling and pitting of the stem but no die-back, though H66, KP423, and N197 selections in the same trial declined severely and numerous deaths were sustained. Sections of affected material showed disorganization of the stem cambium and the presence of double and triple nuclei in the cells.

Annual Report of the Cameroons Development Corporation, 1957.—39 pp., 8 fig., [1958].

In the sections of this report [cf. **36**, p. 637] dealing with agricultural activities (pp. 4–10) and research (28–33) it is stated that in 1955–57 the losses of banana plants from Panama disease [*Fusarium oxysporum* f. *cubense*] amounted to 885,000, 581,000, and 637,000, and of stems from cigar-end disease [*Trachysphaera fructigena* and *Verticillium theobromae*] to 65,000, 9,000, and 9,000. Control of cigar-end was required for about 9 months of the year. Panama disease is now present on all the Corporation's banana estates, and is spreading. It is hoped to have sufficient Lacatan for planting on an appreciable scale by 1960.

Sigatoka disease [*Mycosphaerella musicola*] also spread to all the Corporation's banana plantings; 15,000 acres were considered worth spraying. By the end of the year some 12,200 acres were being sprayed from the air and 3,300 acres by machinery on the ground [cf. **37**, p. 545]. Where the ground is suitable the most efficient machine is the K. D. Giraffe mistblower; banacobre Sandoz at 2·7 lb./9 gal. water/acre on a 2- or 3-weekly cycle following 2–4 fortnightly applications of oil emulsion (20:80) at 6 gal./acre is necessary for control. With knapsack sprayers the application should be oil emulsion (60:40) at 2 gal./acre. Large areas have been sprayed by fixed wing aircraft using Micron atomizers to apply 1 gal. of oil containing 13% Schlofog C/acre fortnightly. Signs of oil damage to the plants became apparent in Aug., but a high degree of control had been obtained. The oil may cause premature death of the leaves and a reduction in fruit weight. An oil emulsion proved less phytotoxic than a pure oil, and Cu could be omitted, but the cycle for oil-spraying must not exceed 2 weeks. It was shown that 17 successive ascospore discharges of *M. musicola* can be obtained by alternately wetting and drying a badly infected piece of banana leaf. The little ascospore discharge from such leaves when allowed to moulder for 2 or 3 weeks in a pile suggests the heaping of dead leaves to be as effective as burning or burying.

The most rapidly growing oil palms became affected by crown disease [cf. **37**, p. 299] and little leaf [cf. **37**, p. 366]; incidence increased where K was applied alone, but this was counterbalanced by the addition of Mg.

A reasonable degree of control of cacao black pod [*Phytophthora palmivora*] was given by K. D. mistblowers applying 2·5 lb. perenox/15 gal. of water 3-weekly during cropping. The disease is most prevalent on high yielding trees. Improved

mistblowers and the use of cocobre (specially made for cacao) should give better control than hitherto. 'Leafless twig' disease of cacao was less apparent.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, **6**, 7, pp. 103–106, 1 fig., 1958.

V. Lasaga reports that *Peronospora tabacina* [map 23], not previously recorded in the W. Indies, was found for the first time in Cuba on tobacco in Nov. 1957.

E. Rojas M. states that race 29 of *Puccinia graminis* [cf. **35**, p. 517], not previously known to occur in Peru, was found in 1956 on wheat in the Province of Huamachuco at 3,100 m. Florence Aurora and Egypt N.A. 101 had up to 30% infection.

Valdeyron (G.). **Rapport sur les travaux de recherche effectués en 1956. vol. 1 ; vol. 2.** [Report on the research work carried out in 1956. vol. 1; vol. 2.]—x(unnumbered)+230 pp., 1 diag., 9 graphs; v+255 pp., 1 pl., 1 diag., 7 graphs, 1 map, Service Botanique et Agronomique de Tunisie. [1958. Mimeographed.]

In vol. 1 [cf. **35**, p. 816], in the section on the work of the Cryptogamic Laboratory (pp. 71–96), A. Petit presents a fully tabulated account of studies on the resistance of wheat lines grown in Tunisia to stem rust [*Puccinia graminis*]; on the effect of commercial treatment of wheat seed against smut [*Ustilago tritici*]; on seed treatment with chemicals against wheat bunt (*Tilletia levis*) [*T. foetida*], covered smut of barley (*U. hordei*), and loose smut of oats (*U. avenae*); on the biological control of internal smut of wheat [*U. tritici*] (with G. Valdeyron); and on the resistance of lines of wheat to *T. foetida*, of barley to *U. hordei*, and of oats to *U. avenae*.

In vol. 2 (section from the Botanical Laboratory of the École Supérieure d'Agriculture de Tunis, pp. 163–255), F. Laudanski presents a further report (pp. 165–179) on diseases of market-garden crops and fruit [cf. loc. cit.], their geographical distribution in Tunisia, the damage they cause, and their control. The diseases are considered in 3 groups: those due to viruses and various forms of degeneration; those soil- and seed-borne; and those air-borne. Tomato virus diseases are not common. *Septoria lycopersici* is widespread on tomato. It is recommended that chilli pepper should be treated with insecticides and screened as protection against virus diseases. The most important disease of globe artichokes is degeneration of virus origin. At least $\frac{1}{3}$ of the potato plantings are free from virus diseases, but the use of selected 'seed' is advocated, and the spread of verticilliosis of potatoes (*Verticillium albo-atrum*) should also be checked by seed selection.

M. Mosnier deals (pp. 181–192) with fungicidal treatments in relation to the phenology of apricot trees and concludes that applications of 2% Bordeaux mixture at stages 0 (flower-buds hibernating, smooth, and glossy), C (red bud pointed), and H (early petal fall) have no toxic effect upon the tree, but retard, or may reduce, the physiological shedding of the young fruits.

J. L. Guillerm describes (pp. 193–196) a spray-warning experiment on the control of *Oidiopsis* [*Leveillula*] *taurica* on chilli, conducted from 23 June to 7 Nov. at Cap Bon, in which 3 unaffected leaves on a healthy plant were examined every 3 days, and the adjoining plot also when conidiophores appeared on these test leaves. Spraying began with the general appearance there of conidiophores (with wettable S, 350 g./hl., 10 applications, 27 July–18 Oct.), but the applicability of the method to a whole region remains to be seen. A similar preliminary study was made by R. Cassini (pp. 197–206) of the dates of emergence of the conidia of *Bremia lactucae* on globe artichoke leaves, but further investigations are required. S. Mehani describes (pp. 207–211) an experiment conducted from 14 Nov. to 28 Dec. in which globe artichoke plants were sprayed against *B. lactucae* within 3 days of

each appearance of the conidiophores, which must be sought on older leaves, as young leaves are unaffected. Observations are necessary every 48 hr., the spores survive 2–3 days, and the minimum incubation period is 6 days. An outbreak may be induced by a light rain or 3 hr. humidity at saturation. Bordeaux mixture 2% is phytotoxic to globe artichokes; affected leaves should be removed and burnt.

A study of the times at which to spray against infection of globe artichokes by *L. taurica* was also begun by F. Laudanski, S. Mehani, and R. Cassini (pp. 213–231). The establishment of infection must be delayed by improved cultural methods and the development of the disease retarded by the use of zineb and captan.

J. L. Guillerm and G. Remond studied (pp. 233–238) the effects of various fungicides on the germination of the spores of *L. taurica* from globe artichoke leaves. Wettable S, zineb, captan, and karathane all inhibited germination satisfactorily, while $KMnO_4$ was less good, and Bordeaux mixture had little, if any, effect. Wettable S, Bordeaux mixture, zineb, captan, and karathane act best when in contact with the spores of *L. taurica*, which is secured readily on chilli, but with difficulty on globe artichoke, owing to the epidermal hairs on the lower surface of the leaves. S dust exerts an action at a distance, but is phytotoxic to artichoke. F. Laudanski presents (pp. 239–255) the results of a preliminary study of the biology of *L. taurica*.

International Code of Nomenclature of Bacteria and Viruses. Edited by The Editorial Board of the International Committee on Bacteriological Nomenclature.—xxii+186 pp., Ames, Iowa, Iowa State College Press, June 1958. $3.50.

This is the authorized edition of the first International Code for the nomenclature of bacteria [cf. **28**, p. 323] as approved by the VI International Congress of Microbiology, 1953. In general the Bacterial Code is similar to the Botanical Code. Its sub-divisions comprise General Considerations, Principles, Rules, and Recommendations which are elucidated by Annotations. In addition there is a brief historical introduction and a series of Appendices dealing with the transliteration of Greek words into Latin, recommendations relative to the choice between orthographic variants, particulars of the first 15 Opinions given by the Judicial Commission, and conserved and rejected names of taxa—including 5 conserved specific epithets.

Buchanan (R. E.). **Microbiological taxa of infraspecific and infrasubspecific rank.**—*Internat. Bull. bact. Nomen. Tax.*, **8**, 2, pp. 97–109, 1958.

The author reviews and contrasts the treatment of infraspecific and infrasubspecific taxa by zoologists, phanerogamists, and bacteriologists and suggests various topics for discussion in order to make the designation of such taxa by bacteriologists more uniform and more precise.

Katznelson (H.). **Metabolism of phytopathogenic bacteria. II. Metabolism of carbohydrates by cell-free extracts.**—*J. Bact.*, **75**, 5, pp. 540–543, 1958.

Further studies [**35**, p. 426] with cell-free sonic extracts of 13 *Xanthomonas*, 5 *Pseudomonas*, 3 *Agrobacterium*, 2 *Erwinia*, and 3 *Corynebacterium* spp. revealed the presence of certain key enzymes involved in the glycolytic and shunt pathways of glucose metabolism. Species of the 3 first-mentioned genera metabolize glucose by the shunt pathway and either by the 6-phosphogluconate splitting system, or the pentose cycle, or both. *Erwinia* spp. may use either the glycolytic or the oxidative route. *Corynebacterium* spp. appear to use the oxidative route *via* the pentose cycle.

Nour (M. A.) & Nour (J. J.). **A simple technique for inoculating pathogenic bacteria on susceptible plant leaves.**—*Nature, Lond.*, **182**, 4628, p. 96, 1958.

At the Faculty of Agriculture, Shambat, University of Khartoum, a chance observation during virus work led to the discovery that the *Dolichos* strain of *Xanthomonas phaseoli* [**35**, p. 880] was very successfully transmitted to *D. lablab* by carborundum abrasion of leaves with a bacterial suspension. Abrasion without carborundum produced fewer lesions which took longer to develop (7–10 as against 5–7 days). The specialization of this strain was demonstrated by this method in its failure to infect a number of other leguminous hosts. Young Domains Sakel cotton plants were successfully infected with *Xanthomonas malvacearum* by carborundum abrasion. The technique has the advantages that little inoculum is needed, heavy infections can be achieved without using high humidity chambers, and the pathogen can be placed exactly.

Ellett (C. W.). **Bacteria parasitic on plants in Ohio.**—*Ohio J. Sci.*, **58**, 3, pp. 145–149, 5 fig., 1958.

Included in this list of 49 spp. and 2 vars. are *Agrobacterium rhizogenes* on pear, *Erwinia dissolvens* on maize, and *Streptomyces scabies* on beet, radish, and potato.

Schaeffenberg (B.). **Beauveria bassiana (Vuill.) Link als Parasit des Kartoffelkäfers (Leptinotarsa decemlineata Say).** [*Beauveria bassiana* (Vuill.) Link as a parasite of the Potato beetle (*Leptinotarsa decemlineata* Say).]—*Anz. Schädlingsk.*, **30**, 5, pp. 69–74, 2 graphs, 1957.

In further work at Graz [**35**, p. 608] heavy sporulation of *B. bassiana* was achieved on an agar medium containing 15% malt extract and 3% meat peptone (Merck Darmstadt). Spores thus obtained were mixed with talc (2:98) and dusted by hand onto larvae in laboratory trials and in the field (100 mg. spores/sq. m.). L2 and L3 larvae died within 5 days in both trials, L4 larvae died within 15 days in the laboratory and 25 in the field, and adults (laboratory only) within 36 days. The fungus is active over a wide range of temperature (0–40° C., opt. 20–30°) and humidity.

Frear (D. E. H.). **Pesticide handbook.**—219 pp., Pennsylvania State College, College Science Publishers, 1958. $1.50.

This revised 10th edition [cf. **37**, p. 12], listing 6,129 products, follows the previous pattern.

Ford (J. H.), Klomparens (W.), & Hamner (C. L.). **Cycloheximide (acti-dione) and its agricultural uses.**—*Plant Dis. Reptr*, **42**, 5, pp. 680–695, 2 fig., 1958. [135 refs.]

This detailed review deals with the uses of actidione against plant diseases, its systemic activity, and its value in soil and seed treatments and for wood preservation.

Crowdy (S. H.), Elias (R. S.), & Rudd Jones (D.). **The control of certain plant diseases with sulphonamides.**—*Ann. appl. Biol.*, **46**, 2, pp. 149–158, 1958.

In *in vitro* tests at Jealott's Hill Research Station (I.C.I.), Bracknell, Berks., sulphanilamide was more toxic to plant pathogenic fungi than to bacterial plant pathogens, but the reverse was true of sulphadiazine and other heterocyclic-ring substituted compounds. The sulphonamides had no effect *in vivo* on facultative plant parasites, apart from giving slight control of *Pseudomonas coronafaciens* on Victory oats. Against obligate parasites, including *Uromyces fabae* on broad beans and *Puccinia triticina* on Wilma and Atlé wheat, they gave effective control

when applied to the roots or the leaves, the minimal effective conc. of the more active compounds in the leaves being 100–200 μg./g. fresh weight of leaf tissue.

The failure of the sulphonamides against facultative parasites *in vivo* is presumed to be due to the physiological isolation of the parasite in the host, which precludes translocation into infected tissue; toxic substances would have to be present in very high concentrations before infection to give any control. With obligate parasites, there is a tendency for substances to accumulate in the infected, still living tissue [**33**, p. 440].

Both the fungitoxic and the phytotoxic effects of sulphonamides in plants could be reversed with *p*-aminobenzoic acid. The N^4-acyl substituted sulphanilamides are intrinsically less toxic to both host and pathogen; deacylation, however, which releases free sulphanilamide, occurs in the plant, with the result that disease control can be achieved with less damage from phytotoxicity. Prolonged treatment with the N^4-acyl sulphanilamides causes damage, induced, presumably, by the cumulative toxic effect of sulphanilamide, more marked with the higher acyl sulphanilamides which are more labile within the plant.

A number of sulphanilamides with acyl substituents on the *p*-amino-group controlled *P. triticina* on wheat with very slight phytotoxicity. Control could be attributed to the release of 'free' sulphanilamide by hydrolysis within the plant.

The sulphonamides showed a certain specificity, though the activity could be related in every case to *p*-aminobenzoic acid antagonism. Sulphanilamide was more active than sulphadiazine against *U. fabae* on broad bean, but sulphadiazine was the more effective agent against *P. triticina* on wheat [cf. **33**, p. 472]. Sulphapyridine was much less active than sulphadiazine against the cereal rust, though present in far higher concentrations. Sulphaguanidine, only weakly mobile in the plant, had some effect against *P. triticina* on wheat when applied directly to the leaves, but not when applied at a slightly lower concentration to the roots.

There seem to be 2 controlling factors limiting the systemic action of sulphonamides against obligate plant parasites: the mobility of a particular sulphonamide within the host, which affects the critical concentration required in the infected tissue, and the specificity of the compound for a particular host-parasite association, which will determine the effect of the critical concentration in controlling the disease.

Byrde (R. J. W.), Clifford (D. R.), & Woodcock (D.). **Fungicidal activity and chemical constitution. VI. The activity of some substituted 8-hydroxyquinolines (oxines).**—*Ann. appl. Biol.*, **46**, 2, pp. 167–177, 1 graph, 1958. [27 refs.]

A preliminary note on this work at Long Ashton Research Station, University of Bristol, has already appeared [**36**, p. 483]. The mechanism of toxicity of the lower homologues of the 5-*n*-alkyl oxines to the spores of *Sclerotinia laxa* is predominantly chemical, that of the *n*-amyl and higher members mainly physical. The ED_{50} value of 5-*n*-amyl-6-hydroxyquinoline, incapable of chelation, against the mycelium of *Aspergillus niger* was 80 times that of non-chelated 5-*n*-amyl oxine, the opt. initial pH for fungistatic activity of which was 5·4–5·6. While the Cu, Fe, and Zn complexes of 5-*n*-amyl oxine displayed some fungistatic activity, this was of a lower order than that of the non-chelated molecule, which in turn was less active than the metal complexes of oxine itself.

Maruzzella (J. C.) & Liguori (L.). **The in vitro antifungal activity of essential oils.**—*J. Amer. pharm. Ass.*, Sci. Ed., **47**, 4, pp. 250–254, 1958.

A tabulated survey is given of experiments at the Department of Biology, Long Island University, Brooklyn, New York, using the filter paper disk method, to determine the toxicity of 92 volatile, 12 terpeneless, and 3 fixed oils to 18 species

of fungi, including a number of human and plant pathogens. The maximum activity among the volatile oils was exerted by those from *Origanum* (red), lemon grass [*Cymbopogon citratus*], thyme (red), sweet birch, savory [*Satureja montana*], *Coriander*, *Sassafras*, cinnamon, distilled laurel leaves, and *Chenopodium*, while the most potent of the terpeneless were from cinnamon, caraway [*Carum carvi*], dill [*Anethum graveolens*], and anise [*Pimpinella anisum*]. The fixed oils possessed no anti-fungal properties. The oils from *Chenopodium*, *Origanum*, and *A. graveolens* were very effective against *Ustilago avenae*, all producing zones of inhibition measuring 45 mm. It is estimated that more than 90% of the volatile and terpeneless oils exercised a fungicidal action. *Streptomyces venezuelae* was the most susceptible of all the organisms to the volatile oils and *Helminthosporium sativum* [*Cochliobolus sativus*] to the terpeneless, while *Candida krusei* was the most resistant to both.

Weltzien (H. C.). **Ein biologischer Test für fungizide Substanzen auf dem Papierchromatogramm.** [A biological test for fungicidal substances on the paper chromatogram.]—*Naturwissenschaften*, **45**, 12, pp. 288–289, 1 graph, 1958.

The following simple and economical method is in use at the Institut für Pflanzenschutz der Landwirtschaftlichen Hochschule, Stuttgart-Hohenheim, Germany. Paper chromatograms, 12×28 cm. (Schleicher & Schüll 2043b), are made of the test solutions or suspensions (20 cu. mm.) using butanol-acetic acid—water (4:1:1) as a solvent; after drying for 12 hr. at room temperature, 12 ml. of a suspension of 200,000–250,000 spores of *Stemphylium consortiale* in 1 ml. nutrient solution is applied. During a 72-hr. incubation period in a moist chamber at 27° a pale grey mycelium develops, from which the treated areas stand out clearly.

The smallest detectable quantities (in μg.) and R_F values of 18 commercial fungicides were as follows: pomarsol forte 0·1 and 0·82; lutiram 0·1 and 0·83; polyram (polyethylenethiuramdisulphide) 2 and 0·83; fuclasin ultra 0·1 and 0·8; F_{40} (iron dimethyldithiocarbamate) 0·125 and 0·81; phytox 80, 5 and streaky; tuzet 0·1 and 0·83; brestan [**37**, p. 61] 2·5 and 0·91; nirit conc. 2·5 and 0·84; orthocide 50, 2 and 0·8; collavin pure (copper oxide) 2·5 and 0·24; coprantol (colloidal adhesive copper) 5 and 0·22; vitigran conc. 5 and 0·24; Bayer mercury spray 5 and 0·87; ceresan liquid 25 and 0·8; cerenox special (phenyl mercuric chloride +17) 0·125 and 0·78; chinonoximbenzolehydrazone (pure) 10 and 0·77; and the same as cerenox 40 and 0·78.

Newhall (A. G.). **An improved method of screening potential soil fungicides against Fusarium oxysporum f. cubense.**—*Plant Dis. Reptr*, **42**, 5, pp. 677–679, 1 fig., 1958.

Tests at the Dept of Tropical Research, United Fruit Co., Changuinola, Panama, showed that many chemicals, even formaldehyde, were rendered ineffective by percolation through a column of soil [cf. **35**, p. 695] in a 1×10 in. vertical glass tube containing agar disks of sporulating *F.o.* f. *cubense* at depths of 7, 5, 3 and 1 in. Of 36 tested, Cal. spray RE-4371, RE-4334, Diamond Alk. 6-N-49, and mylone 85-W at 200 p.p.m. could penetrate to 7 in. and kill the fungus.

Shaw (F. R.), Bourne (A. I.), & Migliorini (R.). **Newer fungicides and their effects on honeybees.**—*Amer. Bee J.*, **97**, 11, pp. 437–438, 1957.

In tests in Pennsylvania and Massachusetts glyodin, captan, fermate, and phenyl mercury lactate (as used for control of apple scab [*Venturia inaequalis*]) were sprayed on bees at temps. up to 70° F., but did not cause appreciable mortality. It is not known if this would hold for higher temps.

Fransen (J. J.). **De landbouwluchtvaart in Nederland.** [Agricultural aviation in the Netherlands.]—*Landbouwvoorlichting*, **13**, 10, pp. 578–585, 2 fig., 1956.

[Reprinted as *Meded. Inst. plziektk. Onderz. Wageningen* 149, 1956. English summary.]

The Instituut voor Plantenziektenkundig Onderzoek is investigating the possibilities of the aerial spraying of crops and is advising the companies concerned.

Directory.—*Phytopathology*, **48**, 5 (2), pp. D1–D72, 1 graph, 1958.

In addition to an address list of members, this Directory commemorating the 50th anniversary of the American Phytopathological Society includes the Society's constitution; lists of presidents, officers, and councillors for the past 50 years; details of the Society's committees; and analyses of membership which numbered 130 in 1909, 1,901 in 1957.

Plant pest handbook.—*Bull. Conn. agric. Exp. Sta.* 600, vi+194 pp., 151 fig., 1956. [Received July 1958.]

This new edition of a handbook published in 2 parts in 1933 and 1934 by W. E. Britton and G. P. Clinton has been compiled by 12 scientists. Brief general introductory sections on diseases and insect injury are followed by descriptions of specific pests and diseases arranged under alphabetical order of the host plants. The illustrations are line drawings.

Sadasivan (T. S.). **Moulds, metabolites and tissues.**—Reprinted from *Proc. 45th Indian Sci. Congr., Madras, 1958*, (part II), 11 pp., 1958. [48 refs.]

In this presidential address to the Botany Section of the Congress the matters touched upon included toxins and antibiotics; the rhizosphere and fungal metabolism; vivotoxins; energy substrates; soil conditions and host physiology; environment, toxaemia, and tissue respiration; and wilt and ionic derangement.

Gregory (P. H.) & Sreeramulu (T.). **Air spora of an estuary.**—*Trans. Brit. mycol. Soc.*, **41**, 2, pp. 145–156, 3 graphs, 1 map, 1958. [23 refs.]

A Hirst spore trap was operated during the 1st half of July 1954 on Thorney Island, Chichester Harbour. The diurnal changes in the air spora were in general the same as in agricultural areas [**37**, p. 10], though the spores of plant pathogens such as *Ustilago*, *Erysiphe*, and *Alternaria* were much less abundant. Dominant constituents were *Cladosporium* and basidiospores in addition to pollen. Hyaline basidiospores, favoured by high humidity and low windspeed, reached a max. in the early mornings (up to 1,000,000/cu. m.). The majority belonged to *Sporobolomyces* and *Tilletiopsis*, the latter being more sensitive to weather, while large hyaline basidiospores (probably from resupinate Agaricales and Tremellales, max. 4,400/cu. m.) appeared only after rain. The relationship of the occurrence of red brown and yellow basidiospores (max. at night: 900 cu. m.) to weather remains uncertain. *Cladosporium* reached a peak about 10.30 a.m., averaging 12,000/cu. m. but sometimes reaching nearly 100,000/cu. m.

Gourmel (Marguerite), Baute (R.), Bellocq (L.), & Canellas (J.). **Sur les rapports entre les conditions météorologiques et la flore mycologique et pollinique de l'air palois.** [On the relations between meteorological conditions and the fungus and pollen flora of the air at Pau.]—*C. R. Acad. Sci., Paris*, **246**, 1, pp. 121–122, 1958.

The results of further studies at the Centre de Recherches climatologiques, Pau, confirmed those already published [**36**, p. 545]. It was also demonstrated that the flux of air masses from N.E. to S.W. is accompanied by large quantities of [unspecified] moulds, the drift from S.W. to S.E. carries a heavy load of pollens, while extensive populations of both groups come from the S.W.

Hitchcock (A. E.) & Zimmerman (P. W.). **Toxic effects of vapors of mercury and of compounds of mercury on plants.**—*Ann. N.Y. Acad. Sci.*, **65**, pp. 474–497, 5 fig., 1957.

Hg vapour damage to Briarcliff and Better Times roses [cf. **35**, p. 892] and privet was studied at the Boyce Thompson Institute for Plant Research, New York. Earlier reports of the effects of Hg on plants are reviewed and the symptoms induced are described. Release of vapour is encouraged when Hg compounds are mixed with organic matter in soil or paint. The rate of recovery of injured roses varies according to the species and the extent of injury: severely damaged plants may produce no normal growth for several months, and then only from the lower parts, whereas with slight injury normal flower shoots are produced within 6 weeks.

There is no conclusive evidence of the translocation of Hg from injured shoots to healthy ones produced subsequently or that Hg is taken up by the roots; when a part is exposed to a toxic dose the symptoms are restricted to that part.

Cooke (W. B.). **Use and value of fungi as biological indicators of pollution.**—Seminar on Biological Programs in Water Pollution, R.A. Taft Sanitary Engineering Centre, April 23–27, 1956, pp. 84–93, 1957. [28 refs.]

A general account is given of the fungi characteristic of sewage and polluted waters [cf. **36**, p. 341; **37**, p. 76]. The author proposes the term 'lymabiont' for fungi growing only on or in the presence of faecal material; 'lymaphilous' for those growing commonly on such material though able to grow on other substrata; 'lymaxenous' for those tolerant of faecal matter; and 'lymaphobous' for those unable to grow in the presence of faeces. The bibliography is annotated.

Pentzer (W. T.). **Better methods of preserving the quality of fresh fruits and vegetables.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 5–10, 1958.

The author discusses, with special reference to Florida, advances in the preservation of fruits and vegetables as they pass from farmer to consumer. The points dealt with include refrigerated transport, precooling, refrigerated display cases, protective packaging, controlled atmosphere storage, chemical treatments, antibiotics, irradiation, and unsolved problems. It was ascertained experimentally that 500,000 rep. (measure of γ ray dosage) are required to kill most of the common fruit-rot organisms, such as *Rhizopus* spp., *Alternaria* spp., *Botrytis* spp., *Penicillium digitatum*, and *P. expansum*. *P. digitatum* and *P. italicum* required 100,000–200,000 rep. to delay infection. Most fruits are injured by such exposure.

Troy (V. S.). **Microanalytical and microbiological techniques in food plant sanitation.**—*J. Ass. off. agric. Chem. Wash.*, **41**, 2, pp. 380–384, 1958.

Included in this useful review is a section on the use of the Howard mould count method for the detection of moulds in canned tomato products [**37**, p. 216].

Fateeva (Mme M. V.) & Gerasimova (Mme N. M.). Совещание по микробиологии бродильных процессов. [Conference on the microbiology of fermentative processes.]—Изв. Акад. Наук СССР [*Bull. Acad. Sci. U.S.S.R.*], *1957*, pp. 644–646, 1957.

This conference, organized by the Microbiological Institute, Ministry of Industry and Supply, and Ministry of Meat and Milk Supply, took place in Kiev on 17–19 Oct. 1956. Of the 32 reports discussed at the conference many dealt with the use of fungi in industrial fermentations.

Ashcroft (J. M.). **The reliability of the soil burial method for evaluating textile preservative treatments.**—*Text. Res. J.*, **28**, 5, pp. 422–427, 2 fig., 3 diag., 4 graphs, 1958.

At the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir,

Virginia, the variability in the degradation rate of cotton duck samples treated with 0·6% copper naphthenate or 0·5% 2,2'methylene bis (4 chlorophenol), known commercially as G-4, was measured in a biologically active soil composed of humus from decayed leaves, sand, and natural sandy loam with a moisture content of 25–27·5% and a pH of 6·2–6·6. The soil beds were in a tropical test chamber in a random-block design, which permitted estimation of the effect of soil variation among the several blocks and the analysis of results as 5 replicate measurements of 10 observations or a single one of 50.

Variation in strength measurements increased with progressive deterioration, reaching a max. at a 40–60% loss of original strength. The increase was greater in the treated than in the untreated samples and for one treatment than for the other. Thus, the untreated lost more of their strength in 4 days than did those treated with G-4 in 40 or the copper naphthenate in 49. At the stage of max. variability the 95% confidence range for measurements based on 10 observations was 43·8% of the original strength for G-4 and 22·4 for copper naphthenate. This degree of precision is not considered to justify the great confidence often placed in soil-burial test data based on 10 or fewer observations/sample. With a view to overcoming most of the disadvantages of conventional methods of reporting data, the author presents and explains a novel procedure in the form of a histogram of the cumulative frequency distribution, illustrating by a graph the probability of failure of fabrics treated by the 2 preservatives under stress of 100 lb./m.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **6**, 7, pp. 107–110, 1958.

Quarantine Proclamation 47P of 24 Dec. 1957 (*Commonw. of Australia Gaz.* 73, 30 Dec. 1957) prohibits the importation into Australia of plants and parts thereof, other than seeds, of lucerne and related spp.

Details are given from Japan of the modifications in the provisions of Plant Quarantine Law Enforcement Regulations, 1950 (including ports of entry) introduced by Amendments of 12 Agriculture and Forestry Ordinances.

Order No. JZ/L. 101/84 of 4 Feb. 1958 (*Ned. Staatscourant* 26, 6 Feb. 1958) governs the importation into the Netherlands of strawberry plants, in relation to red core disease (*Phytophthora fragariae*).

Supreme Resolution No. 246 of 7 Nov. 1957 (*El Peruano* 4997, 14 Nov. 1957) declares the importation of fruit and vegetables (fresh or not) into Peru to be subject to phytosanitary certification.

The [United Kingdom] Importation of New Potatoes and Raw Vegetables Order, 1 Mar. 1958, modifies for specified periods in 1958 certain restrictions under the Importation of Plants Order, 1955 [**35**, p. 747].

Lal (K. B.). **Import of plants and plant materials into India by sea.**—Plant Quarantine Information Sheet No. 1, New Delhi, Directorate of Plant Protection, Quarantine, and Storage, 4 pp., 1958.

The general conditions and specific conditions for various crops, arranged alphabetically, are set out.

Parmasto (E.). **Limatünnik-omapärane Kevadseen.** ['Limatünnik'—a peculiar spring mushroom.]—*Eesti Loodus* [*Nature, Estonia*], *1958*, 2, pp. 106–107, 1 fig., 1 map, 1958. [Russian and English summaries in suppl.]

The geographical distribution of *Sarcosoma globosum*, found in S.E. Estonia, in comparison with that of Norway spruce [*Picea abies*], is considered to indicate a mycorrhizal relationship between them.

Lewis (R. W.). **A graphic presentation of the balance hypothesis of parasitism.**—*Acta bot. Acad. sci. hung.*, **3**, 1–2, pp. 27–29, 1957. [*Biol. Abstr.*, **32**, 6, p. 1781, 1958.]

According to the balance hypothesis [**36**, p. 547], the outcome of a host-parasite

relationship is generally determined by the interactions between the potential parasite and the water-soluble, diffusible substances in the host. Once a diffusion pathway has been established between the parasite and the host, the inherent capacity of the parasite to grow or not to grow in the host's nutritional environment will determine the outcome of the relationship.

Grasso (V.). **La posizione dei nuclei e delle guttule nelle ascospore della Sclerotinia sclerotiorum (Lib.) Massee. Prove di germogliazione di sclerozi della specie.** [The position of the nuclei and of the oil-drops in the ascospores of *Sclerotinia sclerotiorum* (Lib.) Massee. Germination experiments with the sclerotia of the species.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (*1957*), 1, pp. 63–74, 3 pl., 1958. [English summary.]

Further studies on *S. sclerotiorum* [**35**, p. 214] isolated from celery showed that the position of the nuclei does not coincide with that of the oil-drops. The sclerotia germinated best, in 40–45 days, when floated on or immersed in water. The stipes developed by immersed sclerotia were often branched, particularly when the water was constantly agitated.

Berducou (Jeanne). **Action du cuivre sur la croissance et le système enzymatique de Nectria galligena Bres.** [The action of copper on the growth and enzyme system of *Nectria galligena* Bres.] —*C. R. Acad. Sci., Paris*, **247**, 1, pp. 127–129, 1958.

The addition of $CuSO_4$ at more than 1 mg./l. to cultures of *N. galligena* on Knop's medium at $\frac{1}{2}$ strength +30 g. glucose and 13 g. agar/l., adjusted to pH 5·6, promoted the production of tyrosinase [cf. **32**, p. 196], the activity of which increased parallel with rising Cu conc. up to 10 mg.

Talieva (Mme M. N.). Особенности ферментного Аппарата видов **Botrytis** в связи с их специализацией. [The peculiarities of the enzyme apparatus of *Botrytis* species in connexion with their specialization.]—Бюл. главн. бот. Сада [*Bull. centr. bot. Gdn, Moscow*], *1958*, 30, pp. 53–59, 1958.

At the Botanical Garden, Moscow, *B. anthophila*, *B. allii*, *B. tulipae*, and *B. cinerea* were grown in diluted sap (1:10) from different parts of cabbage and dahlia plants mixed with 2% sucrose and then inoculated to cabbage and dahlia. *B. cinerea* isolated originally from these hosts was most virulent and *B. tulipae* the weakest. The enzyme activity of *B. anthophila* and *B. allii* did not differ greatly from that of *B. cinerea* but their protease activity was less. With an increase of parasitic activity among *B.* spp. there is a decrease in proteolytic enzymes; compared with *Penicillium*, *Aspergillus*, and *Rhizopus nigricans* [*R. solonifer*], *B.* spp. have less active protease.

Müller (K. O.). **Relationship between phytoalexin output and the number of infections involved.**—*Nature, Lond.*, **182**, 4629, pp. 167–168, 1958.

In further work at the Division of Plant Industry, Canberra, Australia [cf. **36**, p. 782], an attempt was made to study the relationship between the number of germ tubes of *Phytophthora infestans* penetrating the host and the output of phytoalexin by inoculating pod cavities of bean (*Phaseolus vulgaris*) with known volumes of zoospore suspensions of different concs. After incubation at 20° C. for 24 hr. the droplets were assayed against spores of *Sclerotinia fructicola* for antibiotic activity, assessed by determining the dilution at which germ tube length was 50% of the control. The reciprocal of this was taken as the measure of activity or the number of phytoalexin units/mm. These measurements and the examination of epidermis from the treated cavities, stained in 10 p.p.m. rhodamine B, disclosed no correlation between the number of penetrations and phytoalexin output. Only when

zoospores were reduced to less than 1/sq. mm. was it effectively decreased. It thus appears that phytoalexin production is very high and very constant, suggesting that not only the invaded cells but the adjacent tissue participates.

Orsenigo (M.) & Pavan (D.). **Isolamento, proprietà e modalità di azione della cochliobolina, una tossina prodotta da Helminthosporium oryzae Breda de Haan.** [The isolation, properties, and mode of action of cochliobolin, a toxin produced by *Helminthosporium oryzae* Breda de Haan.] —*Ann. Fac. Agric. S. Cuore*, Ser. **6**, 1 (*Pubbl. Univ. S. Cuore*, N.S., **65**), pp. 19–54, 11 graphs, 1958. [French and English summaries.]

A further study, at the Università Cattolica del Sacro Cuore, Milan, of cochliobolin obtained from culture filtrates of *Helminthosporium oryzae* (*Cochliobolus* [*miyabeanus*: cf. **36**, p. 715]) showed that it affects respiration, not through interference with the respiratory enzymes, but by destroying the physical and chemical equilibrium of the protoplasm.

Boller (A.), Gäumann (E.), Hardegger (E.), Kugler (F.), Naef-Roth (St[ephi]), & Rosner (M.). **Welkstoffe und Antibiotika. 18. Mitteilung. Diaporthin, ein Welketoxin aus Kulturen von Endothia parasitica (Murr.) And.** [Wilt substances and antibiotics. Note 18. Diaporthin, a wilt toxin from cultures of *Endothia parasitica* (Murr.) And.]—*Helv. chim. Acta*, **40**, 3, pp. 875–880, 1957.

At the Institut für spezielle Botanik der Eidgenössichen Technischen Hochschule, Zürich, Switzerland, diaporthin [**33**, p. 569] was isolated for the first time from the culture filtrate of *Endothia parasitica* on a modified Knop's solution. Its properties are indicated. A pale violet fluorescence under ultra-violet light enables minute quantities (0·01 μg.) to be detected. In the wilting test on tomato shoots diaporthin, with a *dosis minima* of 220 mg./kg., proved somewhat less toxic than lycomarasmin or fusaric acid [see below; **37**, p. 22 *et passim*].

Hardegger (E.) & Nikles (E.). **Welkstoffe und Antibiotika. 19. Mitteilung. Eine neue Synthese der Fusarinsäure. 21. Mitteilung. Herstellung der Fusarinsäure aus 2-5-Lutidin.** [Wilt substances and antibiotics. Note 19. A new synthesis of fusaric acid. Note 21. Preparation of fusaric acid from 2, 5-lutidin.]—*Helv. chim. Acta*, **40**, 4, pp. 1016–1021; 7, pp. 2428–2433, 1957.

Full particulars are given of a new method for the synthesis of fusaric acid [see above], based on a procedure described in *Bull. Acad. Sci. U.R.S.S.* (chem.), *1956*, p. 172, 1956, for the production of 5-acyl-2-alkyl pyridines from β-chlorvinyl- and β-aminovinyl-ketones.

The second paper deals with the further simplification of the synthesis of fusaric acid by the alkylation of the commercially obtainable 2,5-lutidin to 2-butyl-5-methyl-pyridine and the condensation of the latter to methyl-propyl stilbazol.

Boller (A.), Corrodi (H.), Gäumann (E.), Hardegger (E.), Kern (H.), & Winterhalter-Wild (N.). **Welkstoffe und Antibiotika. 20. Mitteilung. Über induzierte Abwehrstoffe bei Orchideen. I.** [Wilt substances and antibiotics. Note 20. On induced defensive substances in Orchids. I.]—*Helv. chim. Acta*, **40**, 4, pp. 1062–1066, 1957.

The closer study of some of the biologically active fractions isolated from *Orchis militaris* rhizomes infected by *Rhizoctonia repens* [**22**, p. 171] yielded coumarin [**34**, p. 247] and 2 crystalline substances, one of which is designated orchinol. It could not be demonstrated in fresh rhizomes, but developed only during incubation and in response to the action of the fungus.

Naito (N.) & Tani (T.). **Antibiotic production induced by 2,4,5-T and MCP in Gloeosporium olivarum causing Olive anthracnose.**—*Tech. Bull. Fac. Agric. Kagawa Univ.* (formerly *Tech. Bull. Kagawaken agric. Coll.*), **8**, 2 (23), pp. 157–167, 3 graphs, 1957. [Japanese summary.]

Solvent fractionation of culture filtrates from *G. olivarum* grown in media containing 2,4,5-T or MCPA yielded a yellowish oily crude antibiotic product [see below], the yield increasing with duration of culture and, over the range studied, with the concentration of the 2 chemicals [cf. **36**, p. 486]. The antibiotic is thermostable, practically insoluble in cold water, but soluble in hot and in organic solvents. The growth of *G. olivarum*, *Cochliobolus miyabeanus*, and *Corticium centrifugum* was almost completely inhibited by it at 1:5,000, the dilution end points for these fungi being 1:40,000, 1:10,000, and 1:30,000, respectively. The inhibitory effect of MCPA on *G. olivarum* in culture would appear to be indirect, resulting from the formation of the antibiotic.

Naito (N.) & Kojima (Y.). **Fungitoxic substance production by Gloeosporium olivarum which was grown on media containing either 2-chlorophenoxyacetic acid or 2-methylphenoxyacetic acid.**—*Tech. Bull. Fac. Agric. Kagawa Univ.* (formerly *Tech. Bull. Kagawaken agric. Coll.*), **9**, 1 (24), pp. 18–26, 7 graphs, 1957. [Japanese. Abs. from English summary.]

The growth of *G. olivarum* was studied on peptone salts agar with various supplements. A yellowish, oily fungitoxic substance [see above] was isolated from culture filtrates containing the two chemicals.

Rangaswami (G.) & Sarojani Damodaran (Miss A. P.). **The fungistatic and fungicidal action of mycostatin on Deightoniella torulosum.**—*Curr. Sci.*, **27**, 5, pp. 176–177, 1958.

It is reported from the Agricultural Research Institute, Coimbatore, India, that mycostatin at 10 μg./ml. inhibited spore germination of *D. torulosa* [cf. **36**, p. 666]. At 2·5 μg./ml. there was little or no inhibition, and at 5 μg./ml. there was malformation of the germ tubes.

Arpai (J.), Foltyn (O.), & Janotková (Ol'ga). **Sledovanie výskytu a fungistatických učinkov Trichothecium plasmoparae Viola et Marsais.** [A study of the appearance and fungistatic activity of *Trichothecium plasmoparae* Viola & Marsais.]—*Pol'nohospodárstvo*, **4**, 1, pp. 68–87, 1957. [Russian and German summaries. Abs. from *Referat Zh. Biol., 1958*, 6, p. 202, 1958.]

At the Laboratory of Plant Protection, Slovak Academy of Science, experiments in 1953 and 1955 established that the pink mildew patches on vine leaves were of *T. plasmoparae*, hyperparasitic on *Plasmopara viticola*, and not *T. roseum*, as believed previously. The antibiotic activity of *T. plasmoparae* and its metabolites is stronger against *Aspergillus niger*, *Botrytis cinerea*, *Candida albicans*, *Monilia* [*Neurospora*] *sitophila*, *N. crassa*, and *Saccharomyces cerevisiae* than that of *T. roseum*. The 2 fungi differ morphologically and physiologically, *T. plasmoparae* being more virulent and developing more rapidly on leaves infected by *P. viticola*.

Reuther (G.). **Wechselbeziehungen zwischen Bakterien und Pilzen des Hochmoores.** [Interrelation between bacteria and fungi of the high moorland.]—*Arch. Mikrobiol.*, **26**, 2, pp. 93–131, 18 fig., 1957.

At the Botanisches Institut der Universität Würzburg, Germany, 15 isolates of several root symbionts of Ericaceae closely related to the genus *Cladosporium*, and also isolates of *Mortierella*, *Penicillium*, and *Verticillium*, and 3 unidentified strains of bacteria from high moorland [**34**, p. 254] were studied for their interrelationships in the decomposition of *Sphagnum* and the formation of peat.

The growth of the bacteria was encouraged by the mycorrhizal fungi and by *Penicillium*, and was the result of a substance with the properties of a biocatalyst, which is stabile at room temp. and inactivated at 80° C.

The bacteria inhibited the fungi more or less in their development, but this inhibition was eventually overcome. In addition, the bacteria produced changes in the shape and colour of the mycelia. Amino acids stimulated increased pigment formation in the symbionts.

Brown (Juliet C.). **Fungal mycelium in dune soils estimated by a modified impression slide technique.**—*Trans. Brit. mycol. Soc.*, **41**, 1, pp. 81–88, 1 fig., 1958.

At Royal Holloway College, University of London, dune soil profiles were sampled by impressions taken with sterile 3×1 in. glass slides smeared with nitrocellulose in amyl acetate+5% castor oil. The adhesive was spread thinly and the slide pressed lightly to obtain uniform samples, which were stained for 1 hr. in phenolic aniline blue, rinsed rapidly in sterile distilled water, and dried. The presence or absence of mycelium was recorded in 200 random quadrats (55×55 μ)/slide. Five replicate slides were examined for each soil type at any given depth.

Samples taken from an acid dune system at Studland, Dorset, contained 2–4 times as much mycelium as those from alkaline dunes at Sandwich, Kent, though in both systems the mycelial content of the open sand and fore dunes was very low, increasing with dune development. The amount of mycelium tended to decrease with soil depth but depended also on the presence of organic matter.

This rapid, simple technique is of use particularly with soils low in organic matter, and indicates the mycelial content of a soil without disturbing it to any extent.

Barton (R.). **Occurrence and establishment of Pythium in soils.**—*Trans. Brit. mycol. Soc.*, **41**, 2, pp. 207–222, 1 fig., 3 graphs, 1958. [30 refs.]

In these studies at the Botany Dept, Manchester University, of 25 soil samples from different parts of Britain *P. mamillatum* was isolated from 2 (vegetable garden and 'oat' field), *P. debaryanum* from 3 (flower garden, greenhouse, and potato field), and *P. ultimum* from 4 (vegetable garden, 'wheat' field, and flower beds), using susceptible seedlings as 'baits'. No *P.* isolates were obtained from non-cultivated soils. The behaviour of *Pythium* in relation to pH, moisture content, nutritional status, and texture of cultivated soils and acid woodland soils was investigated by means of susceptible host baits and the glass fibre tape technique [cf. **31**, p. 394].

Using *P. mamillatum* as a test species it was found that maize meal agar in cultivated soil became colonized within 2 days, indicating the species to be a saprophytic 'sugar fungus' [cf. **30**, p. 626]. Growth was greater with increased humidity; in woodland soils, however, these reactions did not occur unless the soil was neutralized with lime. The presence of suitable host plants also proved an important factor in establishing *P.* in soils.

Whereas in cultivated soils, oospores and resting sporangia of *P. mamillatum* formed readily, this was not so in woodland soil, because of its low pH, which probably limits the life cycle of *P.* in acid soils. *Trichoderma viride* was abundant in the more acid soils.

Srinivasan (K. V.). **A technique for isolating pathogenic cultures of Pythium from the soil.**—*Curr. Sci.*, **27**, 5, p. 180, 1958.

In this method described from the Sugarcane Breeding Institute, [Coimbatore,] India, single-eyed cuttings of a sugarcane variety susceptible to *P.* are set in pots watered to and maintained at saturation and covered by an inverted smaller pot. After 3-4 weeks the plants are lifted, the roots washed, and pieces of root plated.

When ammonium sulphate was added to the soil more cuttings yielded *P.*, the species obtained being *P. graminicola*, *P. debaryanum* [see above], and *P. aphanidermatum*.

Garrett (D. S.). **Inoculum potential as a factor limiting lethal action by Trichoderma viride Fr. on Armillaria mellea (Fr.) Quél.**—*Trans. Brit. mycol. Soc.*, **41**, 2, pp. 157–164, 1958.

After referring to previous observations on the relationship of carbon disulphide fumigation and the interaction between *T. viride* and *A. mellea* [**30**, p. 608], the author describes experiments at the Botany School, Cambridge University. Woody inocula [**36**, p. 787] of *A. mellea* were incubated for 23 days at 21–24° C. in autoclave-sterilized soil containing pure cultures of *T. viride* or *Penicillium wortmannii*, also dilutions of these with unsterilized soil to $\frac{1}{4}$, and (with *T. viride*) to $\frac{1}{8}$ strength. The inocula were then brushed clean, set in soil growth tubes, and the subsequent rhizomorph production by *A. mellea* over a period of 76 days was measured.

The results indicated a significant correlation between the inoculum potential of *T. viride* and its lethal effect on *A. mellea*. The sterilized soil gave 95% kill, the $\frac{1}{4}$ dilution, 25%, and the $\frac{1}{8}$, 5%. Pure cultures of *T. viride* diluted to $\frac{1}{4}$ proved slightly more lethal than the maximum activity observed in the earlier experiment [loc. cit.] in soil fumigated with CS_2 before incubation.

Inocula incubated in pure cultures of *P. wortmannii* did not lose viability and produced rhizomorphs at an even quicker rate than the controls.

Bovay (E.). **Carence en bore et dégâts provoqués aux cultures par des applications excessives d'engrais boriqués.** [Boron deficiency and damage caused to crops by excessive applications of boric fertilizers.]—*Rev. rom. Agric.*, **14**, 7, pp. 53–55, 2 fig., 1958.

After briefly noting the part played by boron in plant life, the author deals with the causes of boron deficiency, symptoms in sugar and fodder beets, cauliflower, fruit trees, and vine, its treatment, and the toxic effects of excess boron upon tomato plants and clover.

Sechanov (I. C.). Гъбите в България. [The fungi of Bulgaria.]—763 pp., 111 col. pl., 114 fig., 4 maps (loose), Sofia, State Publishers, 'Nauka i Izkustvo', 1957. 48.60 leva.

This is the 2nd edition. An additional 30 spp. brings the total to 110; all are illustrated and fully described. Other topics dealt with include general knowledge of the larger fungi, truffles and mushrooms, gathering and dressing of edible fungi, their economic importance in Bulgaria, mycogeography of the mountains, keys for identification, and recommendations. There is a tabulated calendar for mushroom gathering.

Lehoczky (J.). **Néhány gazdaságilag jelentős parasita mikrogomba hazai előforhadulása. 1.** [The occurrence of some economically significant parasitic microfungi. 1.]—*Kertész. Szőlész. (Ann. Acad. Hort. Vitic., Budapest)*, **21**, pp. 3–14, 3 fig., 1957. [Russian and English summaries.]

These are first records for Hungary of *Fabraea earliana* [*Diplocarpon earlianum*] on strawberry, *Peronospora matthiolae* on stock (*Matthiola incana*) [cf. **31**, p. 172], and *Gloeosporium polystigmicola* hyperparasitizing *Polystigma rubrum* on plum [cf. **37**, p. 92] (together with *Trichothecium roseum*). All were identified at the Institute of Phytopathology, Budapest.

Gilman (J. C.), Tiffany (L[ois] H.), & Lichtwardt (R. W.). **Fungi new to Iowa.**—*Proc. Iowa Acad. Sci.*, **64**, pp. 85–92, 15 pl., 1957. [12 refs.]

Descriptions are given of 12 microfungi (2 phycomycetes, 7 ascomycetes, 3 fungi

imperfecti), including *Diaporthe taleola* on bark of *Quercus macrocarpa* and other *Q.* spp., not previously reported in America; it appears to be widely distributed in Iowa.

Simonyan (S. A.). Новые формы мучнисторосяных грибов. [New forms of parasitic fungi.]—Изв. Биол. сельск. Наук, Акад. Наук Армянск. ССР. [*Bull. biol. agric. Sci., Acad. Sci. Armen. S.S.R.*], **11**, 6, pp. 87–91, 1958. [Armenian summary.]

Descriptions are given of 14 new forms of powdery mildews, including *Leveillula leguminosarum* f. *meliloti* f. nov. on the leaves and stems of *Melilotus officinalis*, *L. umbelliferarum* f. *carvi* f. nov. on the leaves and stems of *Carum carvum*, and *Erysiphe cichoracearum* f. *carthami* f. nov. on *Carthamus tinctorius*, all in Armenia. The first 2 were severe.

Jørstad (I.). **The genera Aecidium, Uredo and Puccinia of Persoon.**—*Blumea*, **9**, 1, pp. 1–20, 1958.

The author, who has examined the Persoon rust herbarium, furnishes an annotated list of specimens (19 under *Aecidium*, 30 under *Uredo*, and 11 under *Puccinia*) and a review of Persoon's species and varieties. Lectotypes are established for 13 spp. and a list is given of validly published names which cannot be used. For 5 valid species suitable type material could not be found.

Luttrell (E. S.). **The perfect stage of Helminthosporium turcicum.**—*Phytopathology*, **48**, 5 (1), pp. 281–287, 4 fig., 1958. [39 refs.]

In an extended account of observations at Georgia Experiment Station already noticed [**36**, p. 666] the perithecial state of *H. turcicum* is described and named *Trichometasphaeria turcica* Luttrell. The method of producing perithecia is described in detail and the taxonomy of the species fully discussed.

Kole (A. P.). **Elektronenmikroskopische waarnemingen over de zoösporen uit de zomersporangia van Synchytrium endobioticum (Schilb.) Pers.** [Electron microscopic observations on the zoospores from the summer sporangia of *Synchytrium endobioticum* (Schilb.) Perc.]—*Tijdschr. PlZiekt.*, **63**, 6, pp. 361–364, 4 fig., 1957. [English summary.]

These observations have already been noticed [**36**, p. 613].

Buddenhagen (I. W.). **Induced mutations and variability in Phytophthora cactorum.**—*Amer. J. Bot.*, **45**, 5, pp. 355–365, 15 fig., 2 graphs, 1958.

In this expanded account [**37**, p. 76] of mutations induced in zoospores of *P. cactorum* by short exposures (15–60 sec.) to ultra-violet at 2537 A or to X-ray dosages of 4500 r. or more, only the latter produced a substantial mutation rate: under optimum conditions of the former 50% of the resultant colonies were mutants. The colonies were transferred twice before grading for mutants, so as to avoid misinterpretation due to a growth lag. Mutants differed in respect of the abundance, size, shape, and papillation of the sporangia, the abundance and size of the zoospores, hyphal characters (some producing knobs or clubs), and in their ability to grow on natural and synthetic media. Sporangia resembling those of *P. hibernalis* were produced and spherical swellings like those of *P. cinnamomi*. The author considers species separation in *Phytophthora* unsatisfactory in that it overlooks existing or potential variability.

Most mutants grew less vigorously than the wild type, but one produced 3 times as much growth on a minimal medium. The pathogenicity of the mutants for peach, tested by inserting inoculum in slits in the stem, ranged from nil to that of 11 natural isolates. Several of the mutants were unstable in subsequent single zoospore generations: the reason is not yet clear. Zoospores were uninucleate.

Plempel (M.). **Die Sexualstoffe des Mucoraceae. Ihre Abtrennung und die Erklärung ihrer Funktion.** [The sexual substances of the Mucoraceae. Their separation and the explanation of their function.]—*Arch. Mikrobiol.*, **26**, 2, pp. 151–174, 14 fig., 1957.

Experiments with opposite strains of *Mucor mucedo* [**33**, p. 373] and *Phycomyces blakesleeanus* at the Botanisches Institut der Universität Würzburg, Germany, showed that a min. N supply of 0·008 g./100 ml. is necessary to achieve zygote formation, which increases in relation to the N supply. There is a clear morphological and a physiological difference between spontaneous zygophores which appeared in + cultures and contact zygophores. A diffusible gamone system stimulating zygophore formation was demonstrated by a special technique.

Skala (J.). **Zlepšené zařizení pro monosporickou a jednobuněčnou isolaci.** [Better equipment for the isolation of single spores and cells.]—*Čes. Mykol.*, **12**, 3, pp. 189–190, 1 fig., 1958. [German summary.]

A modified microscope nosepiece cutter is described whereby the cylinder of agar cut out is removed from the cutter by a blast of sterile compressed air.

Kristensen (H. R.). **Fremskaffelse af virusfrie planter indenfor havebruget.** [Obtaining virus-free plants in horticulture.]—*Horticultura*, **11**, 12, pp. 189–194, 4 fig., 1957.

A general account of the raising of virus-free plants in Denmark by various organizations, including the government research station at Hornum.

Klinkowski (M.) & Kreutzberg (G.). **Vorkommen und Vebreitung von Gramineenvirosen in Europa.** [Occurrence and distribution of viruses of Gramineae in Europe.]—*Phytopath. Z.*, **32**, 1, pp. 1–24, 13 fig., 1958. [132 refs.]

From the Institut für Phytopathologie, Aschersleben, Germany, the properties of the following viruses are given [cf. **37**, p. 363]. Russian winter and summer wheat [winter wheat] mosaic [**24**, p. 136; **37**, p. 528], which occurs in all winter wheat cultivation areas in the Soviet Union [map 84], with highest incidence in the Voronezh district, is transmitted by *Psammotettix striatus*. Oat pseudo-rosette [**23**, p. 210], transmitted by *Calligypona marginata*, is also recorded only for the Soviet Union. Maize dwarf or rough dwarf disease of maize, transmitted by *Tetraneura ulmi*, has been observed only in Italy [**32**, p. 249]. Red stripe of sorghum [**37**, p. 232] occurs only in N. and central Italy. Cocksfoot streak [loc. cit.] and barley stripe mosaic [loc. cit.] are present in Germany. Barley yellow dwarf [**37**, p. 363] and wheat striate mosaic are also included.

Blattný (C.). **Bemerkungen zur Interferenz der Tabak-Mosaikvirusstämme.** [Interference between strains of Tobacco mosaic virus.]—*Folia biol., Praha*, **2**, 6, pp. 356–361, 1956. [*Biol. Abstr.*, **32**, 6, p. 1779, 1958.]

Mutual protection occurred between 3 strains of tobacco mosaic virus producing white spots on *Physalis alkekengi*, and apparent protection between these and 1 common strain. The symptoms of a stronger strain did not develop when it was inoculated into plants protected by a weaker strain.

Vincente-Jordana (R.). **Acerca de la existencia de un sistema de defensa celular durante la fase de crecimiento : citoarjesis e hipótesis de los citoarjés.** [The existence of a system of cell defence during the growth phase: cytoarjesis and the hypothesis of cytoarjes.]—*An. Edaf. Fisiol. veg.*, **16**, 3, pp. 387–456, 1957. [*Biol. Abstr.*, **32**, 6, p. 1783, 1958.]

Experiments with ungerminated and germinating potato tubers inoculated with [unspecified] soft rot bacteria supported the view that certain relationships exist

between actively regenerating cells and protection from infection. It is thought that when antagonistic cells are in contact, an ideal equilibrium between them should be possible. This equilibrium would be broken in favour of the more actively proliferating cell. The phenomenon may, perhaps, be due to the biological activity of the specific cells. Cytoarjes are defined as ultra microscopic cell entities of a nucleoprotein nature controlling vital processes with a genetic character relating to function. They have two equally active groups, the apoarje (protein) and the coarje (nucleic acid).

Tollenaar (D.). **Zink als stimulans voor vruchtzetting bij Cacao.** [Zinc as a stimulant to fruit-setting in Cacao.]—*Bergcultures*, **26**, 24, pp. 621, 623, 1 fig., 1957. [Indonesian and English summaries.]

In a trial at the Clementina estates, Ecuador, in 1955–6 spraying with dithane (5 kg./ha.) at fortnightly or monthly intervals did not reduce the proportion of pods affected by *Phytophthora* [*palmivora*], but resulted in a 20% increase of total pod production, attributed to the stimulant effect of Zn on fruit setting [cf. **34**, p. 354].

Всесоюзное совещание по иммунитету растений к болезням и вредителям. [Pan-Soviet Conference on plant immunity from diseases and pests.]—Вест. сельск. Науки [*J. agric. Sci., Moscow*], **3**, 6, pp. 151–152, 1958.

Of the 66 papers presented at this Conference in Moscow, March 1958, 24, including 1 by D. D. Verderevski on the increasing variability of races of plant pathogens, dealt with the immunity of cereals from diseases.

Spicher (G.). **Über die Hitzeresistenz der Mikroorganismen des Getreides.** [On the heat-resistance of micro-organisms of grain.]—*Getreide*, **7**, 1, pp. 2–5, 6 graphs, 1957.

At the Bundesforschungsanstalt für Getreideverarbeitung, Detmold, Germany, 99·7–99·9% of the bacteria in 1 g. samples of rye and wheat [**36**, p. 91; **37**, p. 471] were mesophilic, being killed by exposure to 100° C. for 5 min. Thermophiles were rare, averaging 85/g. in rye and 59 in wheat. Spore-forming mesophiles, capable of surviving at 100° for more than 20 min., numbered up to 50/g. in 55–60% of samples of both cereals, and 50–200/g. in 20%. Thermophilic spore-formers were more poorly represented, 75–80% of samples bearing not more than 50/g.

The populations in wheat flour samples were essentially similar, except that the thermophiles were more numerous.

Walsh (T.) & McDonnell (P. M.). **The control of manganese deficiency in Wheat and Oats by the combined drilling of a manganated granulated compound fertiliser.**—*J. Dep. Agric. Eire*, **53** (*1956–7*), pp. 44–52, [1958].

In preliminary experiments in 1954 and 1955 at 2 centres Mn drilled at even 14 lb. $MnSO_4$/acre gave better control than 112 lb. broadcast or a 2% $MnSO_4$ spray shortly before deficiency symptoms appeared. Complete control was given by 56 lb./acre $MnSO_4$ drilled; 28 lb. gave very satisfactory results.

Army (T. J.), Dickey (D. D.), & McNeal (F. H.). **The effect of Barley stripe mosaic on the phosphorus content of eight spring Wheat varieties.**—*Plant Dis. Reptr*, **42**, 6, pp. 747–749, 1958.

At Bozeman, Montana, healthy seed of 8 spring wheat vars. and similar seed infected by barley stripe mosaic virus was sown under 4 levels of N fertilizer [**37**, p. 467]. When 6 in. high, diseased plants contained 5% less P than the healthy, though at maturity there was no measurable difference. N fertilization had no effect on P content at the first sampling date, but tended to lower it in all plants at maturity.

Batts (C. C. V.). **Wheat varieties and disease.**—*J. nat. Inst. agric. Bot.*, **8**, 1, pp. 230–233, 1957.

A short account is given of eyespot [*Cercosporella herpotrichoides*], mildew [*Erysiphe graminis*], black and yellow rust [*Puccinia graminis* and *P. glumarum*: see below], and loose smut [*Ustilago nuda*: loc. cit.], and the reactions over the past few years in England of various vars. to them. In the 1955 black rust epidemic Atson was least affected and Atle and Karn II were almost as good. Atle also ranks among the more mildew-resistant vars.

Batts (C. C. V.). **The reaction of Wheat varieties to yellow rust, Puccinia glumarum, 1951–1956.**—*J. nat. Inst. agric. Bot.*, **8**, 1, pp. 7–18, 1957.

In England *P. glumarum* on wheat [cf. **37**, p. 2] may occur as early as Jan. or its appearance may be as late as early Aug. Assessments of the disease on 93 wheat vars. showed that it may cause up to 50% loss in yield of some susceptible vars. Physiological races collected annually may be divided into 3 groups (A, 2 and 3; B, 5 and 7; and C, 6 and 8), differentiation between the groups being marked but within the groups by reaction on one var. only. A new biotype, 8b, attacked Heines VII, previously thought to be resistant. The reaction of seedlings and mature plants of 82 vars. to races 2b, 5, and 8 showed that seedlings of more vars. are susceptible to 2b than to the other races. Of the vars. tested, Glasnevin Rosa, Koga, Minister, Peko, and Staring were resistant to all races.

P. glumarum was recorded on *Festuca scoparium*, apparently for the first time.

Batts (C. C. V.) & Jeater (Ann). **The development of loose smut (Ustilago tritici) in susceptible varieties of Wheat, and some observations on field infection.**—*Trans. Brit. mycol. Soc.*, **41**, 1, pp. 115–125, 1 pl., 3 fig., 1958.

At the National Institute of Agricultural Botany, Cambridge, seed of the susceptible wheat vars. Hybrid 46 and Vilmorin 27 was infected by *U. tritici* [*U. nuda*] by inoculating the ears by the partial vacuum method [**34**, p. 361]. Mycelium was found in the scutellum and growing point of the infected embryo [cf. below], and when germination commenced the fungus was carried up by elongation of the epicotyl to remain in the node of the first foliage leaf (crown node), later permeating the entire crown structure of the plant. After Apr. the stems elongated, carrying the mycelium up in the ear, which on emergence was completely replaced by spores.

Observations have shown that the incidence of wheat loose smut is not affected by external conditions either at sowing time or during the growing period of the crop.

Batts (C. C. V.) & Jeater (Ann). **The reaction of Wheat varieties to loose smut as determined by embryo, seedling, and adult plant tests.**—*Ann. appl. Biol.*, **46**, 1, pp. 23–29, 1 fig., 1958.

In further work [see above] 57 wheat vars. were inoculated with 2 physiologic races of *Ustilago tritici* [*U. nuda*: **35**, p. 668] by the partial vacuum method and the embryos examined for infection by Simmonds' technique [**25**, p. 258]. Most were fully susceptible to 1 or both races; only 10 displayed real resistance to any 1 race. Braun R and Molinel remained almost immune. The embryo test is indicative of potential crop infection for susceptible vars. In the majority of field resistant vars. the embryo is invaded as in fully-susceptible, but whereas in the latter infection passes from the embryo into the growing-point [see above], in the former it does not spread from the scutellum to the growing point.

Garrett (W. N.) & Futrell (M. C.). **The effect of stem rust of varying infection intensities on yield and other factors in Wheat.**—Abs. in *Phytopathology*, **48**, 6, p. 343, 1958.

Bowie wheat in 12×12 ft. plots was inoculated with race 29 of *Puccinia graminis*

at various intervals in the row. With infection centres 2 ft. apart the yield was 2 bush./acre; 4 ft. 6 bush.; and 6 ft. 8 bush., compared with 13 bush. in uninoculated plots. Maneb increased yield/acre from 2 to 21 bush. and wt./bush from 42 to 60 lb.

Hacker (R. G.) & Vaughn (J. R.). **Report on 1957 field tests of acti-dione derivatives for control of black stem rust of Wheat.**—*Plant Dis. Reptr*, **42**, 5, pp. 609–613, 4 fig., 1958.

In further field tests at Wyoming Agricultural Experiment Station [cf. **37**, p. 30] high concentrations of actidione 'S' (the semicarbazone of the cycloheximide) [**37**, p. 529] again proved very effective against *Puccinia graminis tritici* on Onas wheat. Two applications (200 and 50 gal./acre) of the crystalline compound at 200 p.p.m.+dynawet reduced infection from 25 to 5% and increased yield to 160% of the untreated. The effective rate is, however, uneconomical.

Wang (D.), Isaac (P. K.), & Waygood (E. R.). **Effect of metal ions on the development of Wheat stem rust.**—*Nature, Lond.*, **182**, 4630, pp. 268–269, 1958.

At the Dept of Botany, University of Manitoba, Khapli wheat seedlings at the 2-leaf stage were inoculated with uredospores of *Puccinia graminis tritici* (race 15 B-1) and incubated for 24 hr. in a moist chamber; the leaves were then removed and floated on graded solutions of metallic ions. On the 9th day Ni at conc. as low as 5 p.p.m. consistently and markedly checked infection without inducing chlorosis. Co, Mo, Cu, and Mn were without effect. Khapli leaves, normally resistant to race 15 B-1, became susceptible when floated on water.

In a further experiment with the susceptible vars. Little Club and Marquis, the rust was effectively checked by Ni, though a slightly greater conc. was needed than with Khapli.

The effect of these ions on developing leaf infections does not run parallel with their effect on the germination and growth of uredospores: thus, at 4 p.p.m. Ni, Fe, Zn, and Cu inhibit both germination and growth.

Papavizas (G. C.). **Physiologic races of stem rust of Wheat in Greece in 1953 and 1954 and their pathogenicity on Greek Wheat varieties.**—*Ann. Inst. phytopath. Benaki*, N.S., **1**, 2, pp. 103–114, 3 fig., 1957.

In a joint study by the Institute of Plant Breeding, Thessalonika, and Minnesota Agricultural Experiment Station 7 races and 1 biotype of *Puccinia graminis* [cf. **36**, p. 12] were identified in 41 isolates from 33 uredial collections. Races 14 and 21 comprised 59% of the isolates, and races 11, 17, 34, 40, 75, and a biotype of race 14 the remaining 41%. Seedling reactions are tabulated.

Weibel (D. E.). **Studies on the control of loose smut of Wheat.**—*Plant Dis. Reptr*, **42**, 6, pp. 737–743, 1958.

At Texas Agricultural Experimental Station, Denton, soaking seed in water at 70–75° F. for 4½ days reduced the incidence of *Ustilago tritici* [*U. nuda*: cf. **37**, p. 470] in Quanah wheat from 17·2 (untreated) to 0·6% in 1956 and from 4·6 to 0·2% in 1957 but decreased germination. Addition of ceresan or sodium hypochlorite (100 p.p.m. Cl) to the soak improved germination. A presoak of 6 hr. in water followed after draining by 4½ days' storage in an air-tight container at 70–75° F. reduced smut to 1·1 and 0% in the two years, respectively.

Storchevoy (A. L.). Карликовая головня — опасная болезнь озимой Пшеницы. [Dwarf bunt—dangerous disease of winter Wheat.]—*Plant. Prot., Moscow, 1958*, 3, pp. 30–31, 2 fig., 1958.

A severe outbreak of *Tilletia contraversa* [map 297], which occurred in the Stavropol' region, N. Caucasus, in 1957, is a new record for U.S.S.R.

Gomolyako (M. I.). Грибн на корінні яроі Пшениці. [Fungi on the roots of spring Wheat.]—Микробиол. Журн. [*J. Microbiol., Kiev*], **18**, 3, pp. 12–24, 1956. [Russian summary. Received July 1958.]

At the Microbiological Institute, Ukraine, 29 fungi were isolated in field and laboratory tests from the rhizospheres and roots of the spring wheat vars. Odessa 13, Melyanopus 69, and Narodna. Only *Helminthosporium bondarzewi*, *Alternaria* sp., *H. sativum* [*Cochliobolus sativus*], and *Pyrenochaeta* sp. caused damage. *Rhizoctonia* [*Corticium*] *solani* did not penetrate the roots and is not considered dangerous. Further investigation may show that *Cladosporium* spp. are even beneficial.

Moseman (J. G.) & Reid (D. A.). **Reaction of spring and winter Barleys to cultures of four races and culture P 35 of Ustilago nuda.**—*Plant Dis. Reptr.*, **42**, 5, pp. 614–617, 1958.

Inoculated in the greenhouse at Beltsville, Maryland, 11 of 13 spring and 4 of 19 winter barley varieties and selections were found to be resistant to or immune from infection by races 1, 2, 3, and 4 of *U. nuda* and culture P 35 from Cloninger & Poehlman [**34**, p. 591]. Ogalitsu [**37**, p. 349] was resistant to culture 269 of race 1 but susceptible to P 35, whereas the 4 standard differential vars. [cf. **34**, p. 590] reacted similarly to both cultures. P 35 is therefore considered to be a biotype of race 1.

Russell (R. C.) & Chinn (S. H. F.). **The salt-water soak treatment for the control of loose smut of Barley.**—*Plant Dis. Reptr*, **42**, 5, pp. 618–621, 1958.

In field tests reported from the Canada Dept Agric. Research Laboratory, Saskatoon, Saskatchewan, control of *Ustilago nuda* on 3 barley varieties by soaking infected seed in 1 or 2% saline (NaCl) solution at 76° F. for 58 hr. was about equal to that obtained by the same treatment with water, was much less harmful to germination than any other method tested, and gave higher yields. In another test soaking at 72° for 75 hr. eliminated infection from Gateway, Rex, and Husky samples; 65 hr. was sufficient for Montcalm. Titan was severely damaged at 76°.

Pedersen (P. N.). **Falsk nøgen brand, Ustilago nigra, fundet i Danmark.** [False loose smut, *Ustilago nigra*, found in Denmark.]—*Bot. Tidsskr.*, **53**, 3, pp. 298–306, 6 fig., 1957. [English summary.]

In 1949 an isolated outbreak of *U. nigra* occurred in an assortment of barley varieties at an experimental farm near Copenhagen, this being the 1st record of the smut in Denmark [cf. **34**, p. 713]. Inoculation experiments with *U. nigra* on Maja barley resulted in up to 28·8% infection.

Owen (H.). **Physiologic specialization in Rhynchosporium secalis.**—*Trans. Brit. mycol. Soc.*, **41**, 1, pp. 99–108, 2 pl., 4 fig., 1958.

At the Dept of Agricultural Botany, University of Reading, inoculation experiments with a large number of British isolates of *R. secalis* [**32**, p. 630] showed there was strict host specialization [cf. **17**, p. 22]. Isolates from barley were unable to infect wheat, oats, rye, *Agropyron repens*, *Hordeum murinum*, *Dactylis glomerata*, *Bromus mollis*, *B. sterilis*, *Lolium perenne*, *Phleum pratense*, and other grasses. Four isolates from *H. murinum* were pathogenic to barley as well as to their own host, but 2 isolates from rye infected only rye, and 5 from *A. repens* failed to infect any of the test plants, including *A. repens*. There was no marked feature distinguishing cultures from any one host, with the exception of those from *A. repens*. The term 'f. sp.' is preferred to 'race' or 'variety' for this type of specialization.

Five isolates from Argentina and one from Australia behave similarly to the British.

Farrar (L. L.). **Preliminary studies on yellow-leaf of Oats in Georgia.**—Abs. in *Phytopathology*, **48**, 6, p. 342, 1958.

A disease of oats considered probably due to a virus affected Victorgrain, and to a lesser extent Arlington, Fulgrain, Redrustproof, and Southland in 1956–7. Leaf yellowing, either interveinal or affecting the centre portion or the whole leaf, was seen on scattered plants either in patches or throughout the fields. Chlorosis of flower heads, blasting of florets, and stunting of plants, often with severe reduction in yield, also occurred. Yellow striping was transmitted by [unspecified] aphids in pot experiments.

Craigmiles (J. P.). **Oat disease studies.**—*Tech. Bull. Ga Coll. Agric.*, N.S. 7, 36 pp., 7 fig., 1956. [Received 1958. 40 refs.]

Some of the information from these morphological, physiological, and pathogenic studies of certain races of *Helminthosporium victoriae* at Georgia Agricultural Experiment Station has been noticed [**35**, p. 519]. Mycelial growth increased from 10° C. to an opt. at 30°, ceasing at 35–40°. The opt. pH was 6–7.

In the vars. Victoria, Santa Fe, Landhafer, and Trispernia resistance to race 45 of crown rust (*Puccinia coronata avenae*) [cf. **37**, p. 350] is dominant and monogenically controlled. The Victoria hypersensitive resistance [cf. **34**, p. 714] is closely linked with susceptibility to *H. victoriae* [cf. **33**, p. 149; **37**, p. 473]. Weak linkage between glabrous nodes and resistance to race 45 may be of assistance in selection.

The progeny of Trispernia × Victoria proved susceptible to ergot [*Claviceps purpurea*: cf. **27**, p. 314]; even so the continued use of Victoria is recommended.

Martin (P.). **Einfluß der Kulturfiltrate von Mikroorganismen auf die Abgabe von Scopoletin aus den Keimwurzeln des Hafers (Avena sativa L.).** [Influence of the culture filtrates of micro-organisms on the release of scopoletin from the seedling roots of Oats (*Avena sativa* L.).]—*Arch. Mikrobiol.*, **29**, 2, pp. 154–168, 1958.

The results of previous experiments at the Institut für Pflanzenschutz, Hohenheim, Germany (*Naturwissenschaften*, **43**, pp. 227–228, 1956), showed that as more scopoletin [**36**, p. 428] is released from the roots of oats seedlings, the abiotic factors become more unfavourable for the seedlings. The adverse effect is manifested by a weakening of cell vitality not necessarily characterized by arrested growth and therefore presumably reversible.

In further tests the addition to the seedling culture solution of a bacterial culture filtrate or one of *Fusarium moniliforme* [*Gibberella fujikuroi*] caused up to $3\frac{1}{2}$-fold increase of released scopoletin without any corresponding reduction in root growth. But *Penicillium expansum* filtrate curtailed root growth without increasing scopoletin output. Patulin (the antibiotic produced by *P. expansum*) inhibited the liberation of scopoletin at concs. as low as 10^{-7} M, whereas penicillin exerted a contrary effect at 10^{-3}–10^{-4} M.

It appears probable from these observations that the ability of certain micro-organisms to cause a loss of substances from the root cells is of importance in connexion with the interrelationships of higher plants and the soil mycoflora and with the success of the rhizosphere.

Cammack (R. H.). **Studies on Puccinia polysora Underw. I. The world distribution of forms of P. polysora.**—*Trans. Brit. mycol. Soc.*, **41**, 1, pp. 89–94, 2 fig., 1958.

Two main size groups of uredospores were discovered in an examination of 65 world-wide collections of *P. polysora* [see below; **37**, pp. 203, 406; map 237] on maize, *Tripsacum laxum*, and *Euchlaena mexicana*, the smaller spore form ($28{\cdot}7 \times 22{\cdot}6\,\mu$)

occurring in S.E. Asia and neighbouring islands, but not Borneo where the spores are larger than either group, and the larger ($32{\cdot}7 \times 24{\cdot}8\,\mu$) in the W. Indies, Africa, and the S. Indian Ocean; the United States material is intermediate. Maize in Siam was affected in 1956.

Cammack (R. H.). **Factors affecting infection gradients from a point source of Puccinia polysora in a plot of Zea mays.**—*Ann. appl. Biol.*, **46**, 2, pp. 186–197, 6 graphs, 1 diag., 1958.

Further information is presented on the dispersal of the uredospores of *P. polysora* [cf. **37**, p. 159]. Two plots of Lagos White maize were planted at Ibadan, Nigeria, on 19 Apr. and 2 Sept. 1956. Forty-five days after germination in the 1st planting and after 35 in the 2nd, 16 mature, heavily infected potted maize plants were placed at the centre of each plot, the time of onset of rust having been determined by observation at 10-day intervals in 1953–4. After this, all plants along the circumference of concentric circles of 5, 10, 20, and 40 m. radius from the centre, where a Hirst spore-trap operated 3 m. above ground-level from 1 Apr. to the end of the second crop, were assessed for rust at 10-day intervals until the 30th day. There were also 2 plots on which natural infection was observed. Uredosori numbers were counted on the 3rd, 5th, and 7th leaves above the 2nd stem node (though subsequently the use of only 3 leaves appeared to be a source of error) and the results were expressed as mean pustule number/infected plant population along each circumference. All plants along straight lines 40 m. N.E. and S.W. of the source, i.e. down- and up-wind, were also sampled on the 10th and 30th days.

The truest gradient from a point source was shown by the 10th-day assessment in the 1st plot. After this, and also in the 2nd plot inoculum from outside sources gave a uniform increase in infection. The forms of the disease gradients were also greatly altered by the method and time of assessment, which should be completed before secondary spread has occurred. There was great irregularity in the linear assessment at a distance from the source, but near to it the gradient was normal [cf. **24**, p. 378]. Irregularities were not encountered when the circular sampling method was used and the plant population increased with distance from the source.

Nemlienko (F. E.). Про одне захворювання качанів Кукурудзи. [On a disease of Maize cobs.]—Мікробиол. Журн. [*J. Microbiol., Kiev*], **18**, 3, pp. 48–53, 5 fig., 1956. [Russian summary. Received July 1958.]

In the central region of Ukraine, U.S.S.R. the incidence of yellow rot (*Rhizopus maydis*) in 1947 was only 0·05–0·3% whereas in the S.W. of Odessa it reached 12–14%. Since then it has been increasing every year. The opt. temp. is 32–35° C. and the min. 15–18°. The fungus does not develop in storage and is not seed borne.

Craig (J.) & Koehler (B.). **Pyrenochaeta terrestris and Phaeocytosporella zeae on Corn roots.**—*Plant Dis. Reptr*, **42**, 5, pp. 622–623, 1 graph, 1958.

At the University of Illinois, Urbana, 8 spp. of fungi isolated from the roots of field maize with red root rot were tested for pathogenicity to dent corn seedlings in pots of infested soil in the greenhouse. *P. zeae* and *Pyrenochaeta terrestris* were the only spp. causing extensive and consistent root rot and *P. terrestris* was the only one that induced a red discoloration.

Winter (A. G.) & Meloh (K. A.). **Untersuchungen über den Einfluß der endotrophen Mykorrhiza auf die Entwicklung von Zea mays L.** [Studies on the influence of the endotrophic mycorrhiza on the development of *Zea mays* L.]—*Naturwissenschaften*, **45**, 13, p. 319, 1958.

At the Botanische Abteilung Madaus, Köln-Merheim, Germany, 6-day-old maize plants growing in quartz sand in glazed containers were inoculated with pieces of

mycorrhizal maize root [**30**, p. 283] (3 g./3 kg. sand) and watered with Knop's solution supplemented by Hoagland's A–Z. After 3–4 weeks all the treated plants were better developed than the mycorrhiza-free controls, especially in a series carried out during the summer, when infestation was heavier and more effective than in the winter.

Garcés-Orejuela (C.), Jennings (P. R.), & Skiles (R. L.). **Hoja blanca of Rice and the history of the disease in Colombia.**—*Plant Dis. Reptr*, **42**, 6, pp. 750–751, 1958.

The Jan. 1958 symptoms on rice in the Cauca Valley and at Talima were confirmed to be those of 'hoja blanca' [cf. **37**, p. 534]. Incidence was highest in late-sown fields, some crops being completely destroyed. Symptoms were seen as early as 1935; since then prevalence and severity have varied considerably from year to year [cf. **20**, p. 223].

Van Arsdel (E. P.), Tullis (E. C.), & Panzer (J. D.). **Movement of air in Rice paddy as indicated by coloured smoke.**—*Plant Dis. Reptr*, **42**, 6, pp. 721–725, 4 fig., 1958.

These experiments by the U.S. Army Corps, Fort Detrick, Frederick, Maryland, indicated that the method offers considerable promise in relating the probable paths of fungus spread to air movement. Smoke drift was recorded by colour photographs.

Hirayama (S.) & Udagawa (S.). **Taxonomic studies of fungi on stored Rice grains. I. Penicillium group (Penicillia and related genera) I.**—*Bull. Fac. Agric. Mie Univ.* 14, pp. 21–41, 7 pl., 27 fig., 1957.

The following were found frequently on rice grain imported into Japan in 1953–55: *P. rugulosum*, *P. citrinum*, *P. cyclopium*, *P. implicatum*, *P. chrysogenum*, *P. adametzi*, *P. funiculosum*, and other spp. of the Ramigena section. Descriptions are given of 25 spp. and 2 spp. of related genera. *P. phoeniceum*, *P. piceum*, and *P. diversum* are new to Japan.

Ponnamperuma (F. N.). **Lime as a remedy for a physiological disease of Rice associated with excess iron.**—*News Lett. int. Rice Comm.*, **7**, 1, pp. 10–13, 1958.

The physiological disorder of rice known as 'browning' or 'bronzing' [cf. **37**, p. 352], widespread in the very wet S.W. region of Ceylon, is characterized by marginal discoloration of the older leaves, starting at the tip. The leaves become purplish or orange, with brown spots on the upper half of older leaves, which dry up, greatly retarding growth in severe cases. The roots are scanty, coarse, and dark brown. The disease is worse during the S.W. than the N.E. monsoon, and occurs on all types of soil, though common features are low pH (4·3–4·9), high content of iron oxide, poor drainage, and contiguity with the ferruginous laterite highland.

A previous report [cf. **34**, p. 317] indicated such symptoms to be associated with a high concentration of ferrous iron in the soil solution, and lime was therefore tested for control. Pot experiments at the Dept Agric. Peradeniya with susceptible vars. showed that rates equivalent to 3 tons lime/acre reduced the disease and at 6 tons/acre eliminated symptoms. Whatever the exact cause of the disease, liming the soil to a pH of about 6 appears to prevent it.

Kulkarni (U. K.). **Studies in the development and cytology of Puccinia penniseti Zimm.**—*Trans. Brit. mycol. Soc.*, **41**, 1, pp. 65–73, 5 fig., 1958.

This study showed that the cycle of *P. penniseti* [**36**, p. 97] on *Pennisetum typhoides* and *Solanum melongena* is similar to that of other macrocyclic rusts except that the basidium is 2-celled and the basidiospores are 4-nucleate. There are 3 nuclear divisions in the basidium.

Grant (T. J.). **Heat treatments for obtaining sources of virus-free Citrus budwood.** —*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 51–53, 1 fig., 1958.

Key lime plants infected by the severe strain (T_3) of citrus tristeza virus [**37**, p. 535] were exposed in initial tests to 95–110° F. and in later tests to 98–104° [**37**, p. 40]. At intervals 2-in. pieces of stem from young and old branches, buds from the main stem, or old leaves were removed and grafted to Key lime indicators.

The results indicated that the virus entered almost all the young branch growth that developed during the initial stage of exposure to 98–104°, but eventually virus inactivation appeared to proceed more rapidly in young than in old tissues. Heating for 86–100 days sufficed to inactivate the virus in all the tissues tested, but subsequently in the glasshouse the plants developed vein-clearing and stem-pitting, showing that the virus had not been eliminated from the lower parts.

Two Key lime indicator plants developed apparently healthy growth, though one had been grafted with a piece from a young branch removed after 78 days' treatment, and the other with a piece of an old, pitted branch taken from the same infected source plant after 107 days of heat treatment. The 107-days heat was not sufficient to rid the source plant completely, but subsequent growth was greater than that of a comparable infected plant not heat-treated, and was accompanied by less conspicuous symptoms.

Exposures for 86–100 or more days to 98–104° would appear to be sufficient to obtain propagating material free from tristeza and psorosis viruses.

Psorosis or scalybark of Citrus.—*Agric. Gaz. N.S.W.*, **69**, 2, pp. 90–92, 3 fig., 1958.

A description of the bark scaling symptoms and transient typical patterning of young leaves caused by citrus psorosis virus [cf. **35**, p. 635] and the proposed measures to eradicate it from the State.

Knorr (L. C.) & Childs (J. F. L.). **Occurrence of wood pocket (blotch), chimeric breakdown, and endoxerosis in Florida, with particular reference to the Tahiti Lime.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 75–81, 3 fig., 1958.

Evidence is presented to show that the citrus disease described by G. D. Ruehle from Florida in 1943 [cf. **37**, p. 167] and wood pocket of lemon trees in California [loc. cit.] are sufficiently alike to warrant the use of one name for the two. In wood pocket the sunken areas in the bark rupture and become invaded by weak parasites, such as *Diplodia* and *Phomopsis*. Thus, it is one of the causes predisposing lime trees to bark disease, with which nearly every lime tree in Florida appears to be affected.

The prevalence of wood pocket in Florida limes varies from grove to grove: it is rare only in young groves from carefully selected budwood; in some groves tree condition ranges from apparently normal (very few) to almost dead.

All attempts to transmit wood pocket by budding to 98 citrus seedlings of 11 species failed; nevertheless the condition is perpetuated in scions, i.e. it reappears in the sprouts of buds taken from affected limbs.

It is estimated that during 1920–1950 some 40,000 trees were grown in California from affected sources.

Chimeric breakdown of the fruit differs from wood pocket, where only the outer albedo is affected, in being accompanied by internal breakdown. It bears some resemblance, however, to endoxerosis [cf. **17**, p. 107], recently found on Tahiti limes near Fort Myers, Florida. As chimeric breakdown has been found invariably in association with chimera-like patterns on the peel, it probably stems from an inheritable weakness, a view supported by the fact that leaves on affected trees are more lance-shaped than typical Tahiti lime leaves.

Bud mutations in Tahiti lime are common, but most deviations from parental type appear to be harmless, whereas wood pocket and chimeric breakdown are

destructive. They can largely be prevented by selecting budwood from mature trees without genetic abnormalities.

KLOTZ (L. J.) & DEWOLFE (T. A.). **Techniques for isolating Phytophthora spp. which attack Citrus.**—*Plant Dis. Reptr*, **42**, 5, pp. 675–676, 1 fig., 1958.

These methods are described from the University of California Citrus Experiment Station, Riverside. From fruits ⅔ or more decayed the *Phytophthora* pathogens can usually be obtained free from contaminants by extracting and planting the seeds aseptically on potato dextrose agar or other media; in earlier stages of rot isolations are best taken from the margin of decay in the albedo. The use of apples for isolating from soil [**28**, p. 366] or plant tissues or for obtaining pure cultures is not applicable if contaminants which grow faster than *Phytophthora* spp. are present. *P. citrophthora*, *P. parasitica*, and *P. syringae* have been isolated from soil samples in the laboratory by saturating with water, placing clean lemons on the surface to trap the zoospores, and incubating at 20° C. In the field a lemon or an orange is placed in a can with drain hole and wire bail, buried 6–12 in. under the soil surface or in irrigation furrows. Depending on soil temperature, 4–10 days after irrigation or rain the cans are pulled out and isolations made from fruits with brown rot.

VIÉGAS (A. P.). **Moléstias do Cafeeiro.** [Diseases of Coffee.]—*Bol. Suptda Serv. Café, S. Paulo*, **32**, 366, pp. 33–34, 1957.

Popular notes are given on the symptoms and control of these diseases in São Paulo, Brazil. *Rhizoctonia* [*Corticium*] *solani* [cf. **35**, p. 294] may be combated by spraying with 1% Bordeaux mixture. The so-called 'ararquara' or '4-yr.-disease' is caused by nutritional deficiency and responds favourably to organic manure. *Cercospora coffeicola* is also an indicator of soil impoverishment. *Colletotrichum coffeanum* [*G. cingulata*] occurs exclusively on enfeebled plants. A sooty mould associated with *Cocus viridis* does not call for any specific treatment.

BIANCHINI P. (C. L.). **Las llagas del Café en Costa Rica.** [The cankers of Coffee in Costa Rica.]—*Bol. tec. Min. Agric. Industr. Costa Rica* 21, 27 pp., 19 fig., 1958.

A survey by the Sección de Fitopatología del Ministerio de Agricultura e Industria showed that black canker [cf. **35**, p. 294] is an important disease. *Rosellinia ? bunodes* [cf. **27**, p. 471] was found to be responsible, but a *Fusarium* sp. [cf. **27**, p. 472; **32**, p. 480] was frequently associated with it, causing a slight [unspecified] change in the symptoms at the stem base.

White root cankers yielded *Trichoderma* sp., *Rosellinia* sp., and an unidentified jade green fungus; the pathogenicity of all was confirmed. The disease is attributed to their combined action: it occurs particularly in new clearings where rotting trunks have been left, but is absent from areas burnt over before planting.

The principal agent of ulcerated root canker was a *Curvularia* sp., though *Fusarium oxysporum* f. *coffeae* was frequently isolated and its pathogenicity established. An unidentified yellow fungus was also present, which has not yet been examined for pathogenicity.

A reddish brown rot of the stem base of 1–2-year-old plants was caused by *Cylindrosporium* sp., *Fusarium oxysporum*, and *Tubercularia* sp.

Rhizoctonia [*Corticium*] *solani* produced a cortical rot at the stem base of seedlings [cf. **33**, p. 351], some dying while in others the lesions healed. Plants inoculated at 6 months were not susceptible.

In a laboratory test fermate was superior to tribasic copper sulphate and perenox against *C. solani*, 1% for 1 hr. inhibiting growth. In a field trial of 4 fungicides applied by watering at a rate of 18·9 l. per plant, fermate at 3·6 g./l. was best, reducing the index of white root rot infection and *C. solani* lesions from 20·31 to 7·36, while perenox (2·65 g./l.), the next best, reduced it from 25·17 to 15·23.

The final percentages of infection were 36·2 and 60·5, respectively, compared with 101·4 on the untreated.

Hot-water treatment of seed is impractical as germination is greatly reduced.

Echandi (E.). **La quema de los Cafetos causada por Phoma costarricensis n. sp.** [Coffee blight caused by *Phoma costarricensis* sp. nov.]—*Rev. Biol. trop.*, **5**, 1, pp. 81–102, 7 fig., 1 graph, 1957. [English summary.]

P. costarricensis Echandi induces one of the most important coffee diseases in Costa Rica. It forms globose pycnidia, 100–108 (110) μ diam., and oblong pycnidiospores, 2–3 × 5–6 (7) μ, and produces dark brown to black lesions on the young leaves, stems, and fruits. Fruiting was promoted by V-8 medium; xylose and arabinose were the best sources of C, and potassium nitrate, asparagine, and urea of N. Good growth was made at pH 6 and 20° C.; none occurred at 30°. Penetration is effected exclusively through wounds, generally made by insects in the field. The grasshopper *Idiarthron atrispinum* acts as a vector.

The disease develops shortly after the onset of the rainy season, stems and fruiting branches killed during the previous wet period serving as sources of primary infection.

From the results of preliminary trials orthocide 50-W and tuzet mixed with aldrin appear to be effective in combating the disease.

Robinson (J. B. D.) & Chenery (E. M.). **Magnesium deficiency in Coffee with special reference to mulching.**—*Emp. J. exp. Agric.*, **26**, 103, pp. 259–273, 1 col. pl., 1958.

Studies at the Coffee Research Station, Ruiru, Kenya, and the Agricultural Research Station, Kawanda, Uganda, showed that the critical level of Mg below which the deficiency syndrome is likely to occur and the leaves of Arabica and Robusta coffee to drop [cf. **30**, p. 156; **36**, p. 101] is about 0·2%, though often it was under 0·1%. The critical K:Mg ratio in leaves is about 10:1.

Mulching tended to induce Mg deficiency by supplying an excess of antagonizing K. Fe chlorosis is frequently associated with Mg deficiency for the same reason. Mg levels are maintained or even raised in the cherries despite deficiency in the leaves, and the gross deficiency in the tree is thereby aggravated.

Mg deficiency occurs mainly in older leaves, in the axils of which flowers or cherries are developing. It is present in E. Africa and the Belgian Congo and appears on mature leaves as an irregular dull olive green patch between the main veins, starting at the centre and spreading outwards. The pattern becomes more sharply defined and markedly rhomboid. The interveinal area gradually changes through yellow green to yellow and finally bronze, leaving the veins green (herring-bone-vein chlorosis). Bronzing was particularly prevalent on trees heaped with coffee pulp. On the youngest leaves a fine, fish-net chlorosis occurs, caused by Fe deficiency.

Control by ceasing to mulch is not recommended, as the mulch is essential. Tests of remedial sprays are in progress.

Naim (M. S.). **Responses of wilt resistant and susceptible Cotton variety cut shoots to metabolites of different pathogenic Fusaria spp.**—*A'in Shams sci. Bull.*, **2** (*1957*), pp. 45–54, 2 fig., 1958.

The ends of cut 4-week-old shoots of 3 cotton vars. were placed in cold-sterilized culture filtrates of 3 species of *Fusarium* [**36**, p. 761], all isolated from wilted cotton seedlings and grown on glucose-peptone liquid medium. Giza 26 and Karnak were highly sensitive to *F. equiseti* and *F. solani*, wilting completely in 6–18 hr. Ashmouni was less sensitive to all 3 spp. (24–48 hr.). Wilting was delayed when the filtrates were autoclaved or diluted (1:2 or 1:5). With *F. oxysporum* the rate of

wilt did not vary widely in the 3 vars. but with the other spp. there were greater intervarietal differences. *F. oxysporum* and *F. solani* produced in Giza 26 a leaf mottle resembling that seen in naturally infected plants. In Karnak stimulation of cork cambial activity occurred in the basal discoloured region of shoots in cold-sterilized metabolites of *F. solani*. Blocking of the vessels by gum occurred in all. Adventitious roots were produced by all 3 vars. in N/5 cold-sterilized metabolites of *F. solani* [cf. **33**, p. 619].

Naim (M. S.), Mahmoud (S. A. Z.), & Hussein (A. M.). **Interaction between the rhizospheric microflora of Cotton and Fusarium oxysporum Schlecht in culture. Qualitative and quantitative studies on the rhizospheric microflora of some Egyptian Cotton varieties.**—*A'in Shams sci. Bull.*, **2** (*1957*), pp. 55–64, 3 fig.; pp. 66–83, 6 graphs, 1958.

Additional information is provided on the bacterial strains occurring in the rhizosphere of the susceptible cotton variety Giza 26 at maturity [cf. above; **37**, p. 410]. Most belonged to the *Bacillus subtilis* group and a few to the *licheniformis* group. *B. subtilis* affected the morphology of the fungus and induced autolysis and mycelial deformities, while *licheniformis* strains of *B. pumilus* were also antagonistic. *Aspergillus terreus*, predominant in the rhizosphere, stimulated growth. In the second study the rhizosphere microfloras of Ashmouni (highly resistant to or immune from *Fusarium oxysporum*), Karnak, and Giza 26 (both exhibiting 'varying degrees of susceptibility') were compared with that in the surrounding soil (20 cm. from the roots), bacterial counts being made on soil extract agar and modified Knight and Proom medium, and fungus counts on Waksman's medium (pH 5).

With Ashmouni there were significantly higher rhizosphere/soil ratios for total bacteria, total simple nutritional forms of bacteria, and total fungi. With all 3 vars. most bacteria in both areas were of the genus *Bacillus*. The rhizosphere of Ashmouni had the highest population of *B. subtilis/licheniformis* group and the lowest of *B. megaterium*, while with Giza 26 the reverse obtained. With all vars. *A. terreus* was the dominant fungus both within and outside the rhizosphere. The marked decline in bacterial spore population in the rhizospheres is thought to indicate that the spore formers there are in the vegetative phase, whereas in the surrounding soil they are in the spore form. The significant increase in the rhizospheres of organisms having both simple and complex nutritional requirements [cf. **28**, p. 21] can be related to the supply of inorganic and organic nutrients at the root/soil interface.

Fulton (N. D.) & Bollenbacher (Katharina). **Pathogenicity of fungi isolated from diseased Cotton seedlings in Arkansas.**—Abs. in *Phytopathology*, **48**, 6, p. 343, 1958.

Of 22 fungus isolates tested for pathogenicity on cotton seed and seedlings [cf. **36**, p. 245] in the greenhouse and laboratory *Rhizoctonia* [*Corticium*] *solani* and *Pythium* sp. caused the most pre-emergence killing. In general, pathogenicity was greater at a constant temp. of 21° C. than with 1 week at 27° and then transference to 16°. Only the above 2 fungi, *Colletotrichum* [*Glomerella*] *gossypii*, *Thielaviopsis basicola*, and *Aspergillus flavus* were highly pathogenic to cotton seedlings. Except for *A. flavus*, pathogenicity varied considerably between different isolates of a species. *Fusarium* spp. were only moderately to mildly pathogenic.

Stepantsev (I. N.). Болезни увядания Хлопчатника и борьба с ними. [Diseases causing Cotton wilt and their control.]—Изв. Отдел. естест. Наук Таджикс. ССР [*Bull. Bur. nat. Sci. Tadzhik S.S.R.*], **21**, pp. 89–107, 3 diag., 1957. [Tadzhik summary.]

A detailed study in 1941–1954 on cotton wilt in the Leninabad region, Tadzhik

S.S.R., caused by *Verticillium* [*dahliae*: **37**, p. 586] showed that temp. and humidity play the most important role in its development; 25·2° C. is opt. and 36·8° max. With 13·5–19·3% humidity the disease became epidemic.

With the thin lint cotton varieties the wilt caused by *Fusarium* [*vasinfectum*: **35**, p. 523] appears only when the temp. is less than 36·8°, the opt. being at 29°. The great influence of temp. and humidity is demonstrated by the vars. 2365–B and 504–B, which are highly resistant in the Kurgan-Tube district, where humidity is very low, but susceptible in the Leninabad district; 5904–I, 5931–I, 910–I, and 5476–I are very resistant in Turkmen, with lower humidity and temp. than in Leninabad, where they are susceptible.

Rotation of cotton and lucerne proved very successful, as lucerne increases the humidity and this reduces the temp. For the Leninabad region 45 × 45 cm. between the plants gave good results. Irrigation must be done before the temp. reaches 38·7°. B and Mn applied before sowing increased the respiratory capacity of the plants and their resistance to wilt.

Logan (C.). **Bacterial boll rot of Cotton (Xanthomonas malvacearum (E. F. Smith) Dowson). I. A comparison of two inoculation techniques for the assessment of host resistance.**—*Ann. appl. Biol.*, **46**, 2, pp. 230–242, 1 pl., 1 diag., 1958.

Some of this information from the Cotton Research Station, Namulonge, Uganda, has been noticed [**37**, p. 236]. The methods are (1) the application of bacterial suspension with a fine brush to the outsides of the young bolls immediately after corolla drop, and (2) injection of a suspension into the wall tissue of bolls 3–4 weeks old (i.e. after the shedding period) with a fine needle, only 1 mm. long; deeper penetration causes oozing of sugars, which favours secondary organisms. Brush inoculation supplies the best criterion of the end-product of lint damage, for which needle inoculation is too late. Subsequent shedding and insect attack are a disadvantage in brush-inoculation, insect attack making the assessment of bacterial lint damage very difficult. The choice of technique thus depends on the area, brush inoculation being preferable if the environment conduces to natural infection and physiological shedding and insect attack are not excessive.

The results obtained by both methods suggest that resistance derives from an antagonistic factor operating against the bacterium in the boll wall tissue; resistance does not derive from a physical factor which prevents entry. The fact that in resistant strains the lesions made by either method are small and dry rapidly confirms this. If there were a factor inhibiting entry, there would be a closer correlation between needle- and brush-lesion size, when escapes are excluded, than when they are included and ranked as 0, but in fact there is then a closer association between the two lesion-sizes.

Variability in resistance in local strains of cotton could probably be used to give high resistance without a large crossing programme to introduce new genes. As resistance appears to break down in the boll stage first the most promising method of obtaining resistance to the other phases of the disease would probably be by ensuring a high level of boll resistance.

Flor (H. H.). **Mutation to wider virulence in Melampsora lini.**—*Phytopathology*, **48**, 6, pp. 297–301, 1958.

Further information is presented from State College Station, Fargo, N. Dakota, on X-ray mutations induced in F_1 uredospores of race 22 × race 1 of *M. lini* [cf. **36**, p. 340; **37**, p. 284] tested on 24 flax vars. The genotype for pathogenicity was postulated by selfing the parent races and from the pathogenicity of F_1 hybrid cultures. It proved homozygous for virulence on 5 vars., for avirulence on 3, and heterozygous (avirulence dominant) on 16. From the number of primary uredia from inoculation on susceptible vars. with the treated spores it was calculated that

some 200,000 viable spores were assayed for mutants on each resistant var. Those vars. to which the F_1 culture was homozygous for avirulence, and 5 of those to which the F_1 was heterozygous for pathogenicity were resistant to all mutants.

Of 154 mutations to virulence observed on other vars. (2–49/var.) 94 were suitable for pathogenicity tests; 92 of these differed from the F_1 in attacking 1 additional var. or group of vars; the others each attacked 2 such. The groups of vars. on which pathogenicity was linked were those on which it appeared to be conditioned by a unit mutation; 8 mutant races (7 new) were obtained. Two naturally mutating genes secured were the same as those mutating most frequently in response to X-rays.

Nair (P. N.). **Effect of maleic hydrazide, thiourea, and 2,4-dinitrophenol on resistance to Flax wilt.**—*Phytopathology*, **48**, 5 (1), pp. 288–289, 1958.

At the University of Minnesota, St. Paul, the above chemicals, the 1st two at 2×10^{-4}, 5×10^{-4}, and 10^{-3} M, and DNP at 10^{-5}, 2×10^{-5}, and 5×10^{-5}, were applied in greenhouse experiments to a soil-vermiculite medium in which Redwood and B 5128 flax seedlings, resistant to *Fusarium oxysporum* f. *lini* [*F. lini*], were growing, some of which had been inoculated through the medium. The percentage wilt among treated inoculated plants was greater than among the untreated [cf. **35**, p. 51] and increased with the conc. of the chemicals, DNP being the most active. Redwood did not completely lose resistance in any treatment.

In *in vitro* experiments all the chemicals stimulated growth of the pathogen, especially the higher concs. of thiourea. There was, however, no correlation between the effect of the chemical *in vitro* and on the severity of wilt in the plant.

Ghosh (T.) & Mukherji (N.). **Tip-rot of Mesta (Hibiscus cannabinus Linn.)**—*Curr. Sci.*, **27**, 2, pp. 67–69, 2 fig., 1958.

In test plots at Nilganj, W. Bengal, a disease somewhat similar to brown-rot [*Volutella* sp.: cf. **34**, p. 35] but caused by a fungus tentatively identified as *Trichosphaeria* sp. with *Phoma* pycnidia becomes epidemic in July and Aug. Stipules of young leaves turn brown and wither, lesions at the petiole base cause developing leaves to wither and fall, and finally the whole stem tip shrivels. The perithecia were 115–249 (mostly over 230) μ diam., the asci 61·9–65·36 $\times$ 9·8–10·32 μ, and the ascospores 7·5–12 $\times$ 4·1–6·1 (mostly 10 $\times$ 6·1) μ. The pycnidia were 61·92–130·72 (mostly 110) μ and the pycnospores 6·1–13·7 $\times$ 2·7–4·1 (mostly 10·8 $\times$ 2·7) μ. *H. radiatus*, and the F_4 progeny from *H. cannabinus* $\times$ *H. radiatus* are resistant. The remainder of the varietal collection proved generally susceptible.

Coe (D. M.). **Some recent developments in diseases of ornamental plants in Florida.**—*Proc. Fla hort. Soc.*, **70** (*1957*), p. 390, 1958.

Wilt (*Fusarium* [*oxysporum* f.] *perniciosum*) of *Albizzia julibrissin* [cf. **37**, p. 45 and below] is well established over a large area in northern Florida, where it is causing serious losses.

In July and Aug. 1956 a crown, stem, and leaf rot of chrysanthemums caused by *Pythium* sp. [cf. **37**, p. 207] was reported from major chrysanthemum-producing areas of the East and Gulf Coasts. The disease spreads very rapidly radially from a centre of infection during the warm, moist period of summer.

Gill (D. L.). **Effect of root-knot nematodes on Fusarium wilt of Mimosa.**—*Plant Dis. Reptr*, **42**, 5, pp. 587–590, 1 fig., 1958.

At Tifton, Georgia, *Albizzia julibrissin* seedlings planted in soil infested with *Fusarium oxysporum* f. *perniciosum* [see above] and either *Meloidogyne incognita* or *M. javanica* wilted more readily than those in soil infested only with *Fusarium*. The nematodes alone reduced seedling size but caused no wilt.

Bozarth (R. F.) & Corbett (M. K.). **Virus diseases of Gladiolus in Florida.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 363–370, 5 fig., 1958.

Progress is reported in this study, begun in 1956. The literature of the 6 viruses investigated is briefly reviewed and the results of the authors' inoculation experiments are presented. Cucumber mosaic virus [cf. **36**, p. 648] was isolated from gladiolus plants with a necrotic streaking of the leaves and flower break and bean yellow mosaic virus [cf. **36**, p. 370] from those with various degrees of mottling.

Magie (R. O.). **Soil fumigation in controlling Gladiolus Stromatinia disease.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 373–379, 2 fig., 1958.

Greenhouse and field experiments conducted from 1955–57 at the Gulf Coast Experiment Station on soil treatments against *S.* [*Sclerotinia*] *gladioli* [cf. **36**, pp. 807–811] are described. Stock for fields planted for the first time should come from hot-water treated cormels grown in clean soil. Corms and cormels suspected of being infected should be dipped in an organic mercury fungicide before planting. Severe losses from infected soils can be avoided by not planting during autumn [**35**, p. 368]. When old gladiolus fields are to be planted during the critical months, the soil should be treated first with vapam, crag mylone, or terraclor.

Kling (E. G.). К физиологии Гладиолусов при болезни желтения. [On the physiology of Gladioli with yellows disease.]—Бюл. главн. бот. Сада [*Bull. centr. bot. Gdn, Moscow*], *1958*, 30, pp. 72–77, 1958.

In several regions in U.S.S.R. infection by *Fusarium* sp. and yellows [see below] have become very severe since 1954. For control the author recommends that an interval of 3–4 years should elapse before planting corms in fields that have had diseased plants; that diseased plants be destroyed early in the season; NPK fertilizer at 1:3:2 or 1:3:3; disinfection [cf. **33**, p. 73] of the corms after harvesting and before planting; and the use of resistant varieties only.

Protsenko (E. P.). Преждевременное желтение Гладиолусов. [Premature yellowing of Gladioli.]—Бюл. главн. бот. Сада [*Bull. centr. bot. Gdn, Moscow*], *1958*, 30, pp. 78–84, 1 fig., 1958.

In many districts in U.S.S.R. yellowing of gladioli, caused by *Fusarium* spp. [see above and below] reaches 60–80%. The predominant species appear to be *F. orthoceras* var. *gladioli*, causing withering, and *F. oxysporum* var. *gladioli*, rotting the corms. The pathogenicity of the 2 species was established by inoculation and dipping the roots in a spore suspension. Withering and yellowing [cf. **23**, p. 345] is a specific tracheomycosis following the rotting of the rootlets by nonspecific *Fusarium* infection.

Burnett (H. C.). **Orchid diseases.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 380–385, 4 fig., 1958.

Brief notes are given on the symptoms and control of 26 orchid diseases.

Gualaccini (F.). **Una virosi della Rosa nuova per l'Italia. Suoi rapporti con le virosi dei fruttiferi.** [A virus disease of the Rose new to Italy. Its relation to viroses of fruit trees.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (*1957*), 1, pp. 79–88, 3 fig., 1958. [English summary.]

In May 1957 the author received from Montecastello di Vibio, Perugia, rose plants the leaves of which bore yellow, sinuous lines, often near the margin or the tip; yellow spots running symmetrically along both halves of the leaf blade, sometimes delimiting oak-leaf areas of normal green colour; yellow areas, mostly shading off, in the central part of the leaf or spreading towards it from the margins; and a yellow speckle, either localized or scattered irregularly over the leaf surface.

Chip-budding to *Prunus serrulata* var. Kwanzan killed the inoculated plants; one, however, made normal growth and appeared to be healthy after the withered, inoculated twig was removed. Because of the analogy between the reactions of *P. serrulata* to this virus and to a severe strain of [peach] ring spot virus [cf. **36**, p. 653], it is concluded that peach ring spot was present in the affected roses.

1958 spray recommendations for tree fruits in eastern Washington.—*Ext. Bull. St. Coll. Wash.* 419, 40 pp., 8 fig., 1958.

The annual revised edition [cf. **36**, p. 596].

Bovey (R.). **La maladie des proliférations du Pommier.** [The proliferation disease of Apple.]—*Rev. rom. Agric.*, **14**, 7, pp. 57–60, 5 fig., 1958.

The chief symptoms of proliferation disease [str. of apple witches' broom virus: cf. **34**, p. 598; **37**, p. 288] and the order of their appearance are briefly described. Other points noted include the effect on yield (losses may reach 95%, as dwarfed fruit may be unsaleable), the transmission and dissemination of the virus, and control.

Hårdh (J. E.) & Sulkinoja (M.). **Alternaria-Fusarium-ja Venturia-itiöden runsaus ilmassa.** [The content of *Alternaria*, *Fusarium*, and *Venturia* spores in the air.]—*Maataloust. Aikakausk.*, **30**, 1, pp. 10–19, 1 fig., 4 graphs, 1958. [English summary.]

In 1956 a Hirst spore trap [**31**, p. 618] was in continuous action during 10 May–5 July at the Horticultural Research Institute, Piikkiö, Finland. The first *V. inaequalis* ascospores [**36**, p. 193] were discharged from apple leaves on 13 May and detected in the air a week later. The last liberation was on 22 June and spores were detected until 4 July. The max. conc. was 340 spores/cu. m.

In 1957 the first discharge was on 18 May and the last on 16 July; spores were found in the air from 18 May until 6 July. During the primary infection period they were abundant on every wet day and for 2–3 days after heavy rain. The air content of *Alternaria* spores did not appear to be influenced by meteorological conditions, whereas those of *Fusarium* were most plentiful on rainy, warm days.

Hey (G. L.). **Guidance for Apple mildew control.**—*Grower*, **49**, 16, pp. 1017–1018, 1 fig., 1958.

Following notes on the cultural control of apple mildew [*Podosphaeria leucotricha*: **37**, p. 541] recommendations are given for high-volume spray formulations, including wettable S or karathane [cf. **37**, pp. 486, 587], according to the degree of infection [in Britain]. Information appears to be lacking on the relative value of low-volume application of such sprays and on the use of wetters with the latter. The author considers that with S wetters may cause russetting, but with karathane they should be used as with high-volume sprays.

Hunnam (D.), Bagnall (B. H.), & Bennett (M. F.). **Knapsack spraying with captan in laden orchards.**—*Grower*, **49**, 13, pp. 800–801, 2 fig., 1958.

One of the new motorized knapsack low-volume sprayers and dusters, the Motoblo, was found very efficient and easily operated in 3 trials by the Murphy Chemical Co. in 1957 against *Gloeosporium* spp. [**37**, pp. 541, 587] on apples in Herts. Captan [cf. **37**, p. 47] at 5 lb. 50% wettable/acre/application significantly reduced infection on apples in store, irrespective of the amount of water used. As a dust it was less satisfactory. The results of trials from 1955–57 are tabulated; 3 high-volume applications (3-weekly) from the end of July reduced crop losses by 45–74%.

Braun (H.) & Kröber (H.). **Untersuchungen über die durch Phytophthora cactorum (Leb. u. Cohn) Schroet. hervorgerufene Kragenfäule des Apfels.** [Studies of collar rot of Apple caused by *Phytophthora cactorum* (Leb. & Cohn) Schroet.] —*Phytopath. Z.*, **32**, 1, pp. 35–94, 14 fig., 7 graphs, 1958. [74 refs.]

In further work at the Institut für Pflanzenkrankheiten, University of Bonn, Germany, the mycelium of *P. cactorum* [**35**, p. 103] was found to be drought resistant but requiring high atmospheric humidity for its development, which is to a great degree independent of the O tension necessary for the formation and germination of the zoosporangia.

A strong toxic effect of several commercial fungicides *in vitro* was demonstrated by their influence on the mobility and germinability of the zoospores; Hg compounds at low concs. and Cu_2O at high were very satisfactory in their initial effect, whereas $CuSO_4$ was hardly fungicidal even at high concs.

Isolates from different sources showed varying pathogenicity to different kinds of plants and parts thereof, those highly pathogenic to apple being mostly from apples and the fruit of fruit trees, whereas some isolates normally pathogenic on other plants were avirulent.

Several commercially very important German apple varieties have proved susceptible to *P. cactorum*. EM IV and EM IX stocks are resistant, but all other EM stocks are susceptible [**37**, p. 287]. Two-yr.-old Kassins Frühe and Schattenmorelle cherry trees, inoculated in the field, were more strongly attacked than the most susceptible apple varieties.

The hitherto exclusive occurrence of the disease on the lower part of the trunk can be explained by the selective cultivation of susceptible varieties as stocks. The fissured bark at soil level and/or at the grafting point presents a favourable microclimate for infection. The smooth, quick-drying bark of the upper parts of the tree provides a natural protection against infection. *P. cactorum* spreads most rapidly in the bark parenchyma, more slowly in the sieve tubes and cambium, and hardly at all in the pith. The opt. temp. for mycelium growth in the tree is 16–21° C. compared with 25° *in vitro*. As the fungus dies very quickly in dead bark it must be considered an obligate parasite on apple. The causes of its death are bacterial metabolic products and breakdown products of the dead cells, including phloretin and phloridzin and a substance not yet identified. Fallen and low-hanging fruit are the principal or intermediate places where the fungus breeds most actively, while the ground serves as a spore reservoir.

Collar rot is widespread only in the western part of W. Germany. This is because of the heavy showers peculiar to this district and favourable to infection.

Control measures recommended are destruction of infected fallen fruit and the greatest possible chemical protection of the lower trunk (up to 75 cm.) of susceptible trees at a vulnerable age at ground temp. of 17–18°, and in new plantings by high grafting on resistant stocks or resistant intermediate grafting.

The possibility of a cure requires early detection of an attack and the immediate killing of the fungus at the margin of infected parts by burning with a welding or soldering lamp or by repeated cutting out, to be followed by careful treatment of the wound.

Garman (P.) & Mathis (W. T.). **Studies of mineral balance as related to occurrence of Baldwin spot in Connecticut.**—*Bull. Conn. agric. Exp. Sta.*, 601, 19 pp., 1956. [35 refs.]

Bitter pit of apples [cf. **37**, p. 487] is attributed to mineral imbalance, particularly between Ca and Mg or Mg+K, the leaf/fruit ratio also being a relevant factor, likely to be upset by heavy N fertilisation or heavy pruning. Soil and spray applications of Ca salts were partially effective as a cure. The possible role of B is still uncertain.

KenKnight (G.). **Thermal stability of Peach rosette virus.**—*Phytopathology*, **48**, 6, pp. 331–335, 2 fig., 1958.

A series of experiments is described from the U.S. Horticultural Field Laboratory, Fort Valley, Georgia, in which stems, or sometimes entire trees, of peach and plum inoculated with peach rosette virus (PRV) [**22**, p. 316] from 10 sources were given hot-water-bath treatments. No PRV transmission occurred when bark patches from stems treated for over 18 min. at 50° C. were grafted to healthy trees. From treatment of entire trees the thermal death times of PRV, judged by the behaviour of the trees after treatment, appeared to be less than 90 min. at 45°, about 18 at 50°, and 2 at 55°. However, 60 min. at 50° and 10 min. at 56° were indicated by a 'nurse tree' technique, each treated tree being grafted to a healthy tree (*Prunus angustifolia* was the most satisfactory) by unions of the roots, trunk, and branches, wherever contacts could be made, the paired trees being planted in the orchard. This enabled a thermal death time of the virus exceeding that of the host to be demonstrated, since 'nursed' branches sometimes remained alive and developed symptoms when the rest of the tree had died, or the virus was transmitted to the 'nurse' tree.

McClure (T. T.). **Brown and Rhizopus rots of Peaches as affected by hydrocooling, fungicides, and temperature.**—*Phytopathology*, **48**, 6, pp. 322–323, 1958.

At Beltsville, Maryland, tests from 1954–56 showed that while hydrocooling for 15 min. with iced water alone had little effect on the decays, addition of clorox (sodium hypochlorite), giving 200 p.p.m. chlorine, reduced *Monilinia* [*Sclerotinia*] *fructicola* on inoculated peaches by 29% and *Rhizopus stolonifer* by 4% [cf. **36**, p. 37], and the corresponding figures for 0·1% dowicide A were 64% and 17%. Holding peaches, not hydrocooled, for 5 days at 40° F. had no effect on brown rot development during subsequent ripening at 75°, but reduced *R.* rot by 25%. A combined treatment of hydrocooling in 0·1% dowicide A followed by 5 days at 40° reduced brown rot by 91% and *R.* rot by 47%.

Verneau (R.) & Rosa (M.). **Prime prove di lotta in pieno campo contro la 'vaiolatura batterica' dell' Albicocco, con un preparato a base di streptomicina e terramicina.** [Preliminary field tests against bacterial leaf spot of Apricot with a preparation containing streptomycin and terramycin.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (*1957*), 1, pp. 171–186, 1 fig., 1958. [English summary.]

In spraying tests near Naples 5 applications of agrimycin-100 at 0·07% at intervals of 8 days immediately after the fruitlet stage reduced infection of apricot fruits by *Xanthomonas pruni* [**35**, p. 530] but failed to provide protection against secondary infection. A temporary leaf chlorosis followed the treatment, especially after the first few applications. Good control was also given by 3 applications of 1·5% $ZnSO_4$ at intervals of 15 days, but this caused considerable damage to the fruit epidermis and slight leaf burn.

Stanová (Mária). **Príspevok k symptomatike huby Clasterosporium carpophilum Lév. (Aderh.) na Marhuli.** [Contribution to the symptomatology of the fungus *Clasterosporium carpophilum* (Lév.) Aderh. on Apricots.]—*Biologia, Bratislava*, **12**, 8, pp. 618–621, 4 fig., 1957. [Russian and German summaries.]

In Czechoslovakia *C. carpophilum* attacks not only apricot fruits [**30**, p. 172] and leaves but also the branches and buds, forming under the flower and leaf buds typical excrescences and stigmatic, necrotic wounds which in some localities, e.g., Sládkovičovo, become canker-like. Following the development of a reddish to dirty white discoloration of the epidermis and its rupture, concave areas and fissured, round, corky spots are formed on the branches. Chlamydospores were detected in the leaf scars, lenticels, flowers, and shrivelled buds, as well as in the gummy exudate which normally accompanies the pathogen.

Skalický (V.) & Niederlová (Běla). **Poznámky k revisi padlí (Erysiphales) na Ribes L. a Grossularia A. Rich.** [Observations on revisions of mildews (Erysiphales) on *Ribes* L. and *Grossularia* A. Rich.]—*Čes. Mykol.*, **12**, 3, pp. 163–169, 5 fig., 1958. [German summary.]

While revising herbarium material at the Botanical Institute, Charles University, Prague, the authors found *Phyllactinia guttata* on a specimen of red currant between 125 and 150 yr. old. This constitutes the 1st record on this host and the 2nd on *Ribes* in Europe. They consider *Microsphaera grossulariae* (Fr.) Berk. to be correct for author citation. In view of the report by Golovin [**37**, p. 400] of *Leveillula saxifragacearum* f. *ribis* on *Ribes* in Tadzhik S.S.R. the author suggests that the import of *Ribes* from this area should be prohibited.

Harrison (B. D.). **Raspberry yellow dwarf, a soil-borne virus.**—*Ann. appl. Biol.*, **46**, 2, pp. 221–229, 1 pl., 1958.

At the Scottish Horticultural Research Institute, Invergowrie, Dundee, raspberry yellow dwarf virus [**37**, p. 200] was isolated from naturally infected raspberry, strawberry, and blackberry plants, and from several species of weeds. The severe disease it produced in Malling Exploit raspberry usually occurred in patches in plantations otherwise normal; these patches enlarged from year to year. The virus was differentiated from the raspberry ring spot [Scottish leaf curl: cf. **36**, p. 107] and tomato black ring [**37**, p. 463] viruses by the symptoms on *Chenopodium amaranticolor*, tobacco, and petunia, which are detailed, as well as by plant protection and serological tests, which distinguished it also from tobacco ring spot and cucumber mosaic viruses. The virus lost its infectivity when sap was heated for 10 min. at 61° C., diluted to 10^{-5}, or kept for 15 days at 18°, and it was precipitated without inactivation by acetone and ammonium sulphate.

Raspberry and sugar beet plants became systemically infected when grown under glass in soil from a field with affected raspberry plants, where the virus persisted in the soil for 3 yr. after the raspberry plants had been removed. The virus seems to be widespread in England, though of recent introduction, and has been found also in Essex and Kent, but appears to be rare in eastern Scotland. The importance of weed hosts for the occurrence and survival of viruses is stressed, and it is suggested that other viruses with no known vectors may be soil-borne.

Sequeira (L.), Steeves (T. A.), Steeves (Margaret W.), & Riedhart (J. M.). **Role of root injury in Panama disease infections.**—*Nature, Lond.*, **182**, 4631, pp. 309–311, 3 fig., 1958.

Experimental inoculations of roots of young Gros Michel banana plants at the United Fruit Co., Coto Station, Costa Rica, were made by 2 methods with 3 morphologically distinct, but equally pathogenic, isolates of *Fusarium oxysporum* f. *cubense*. Similar results have already been presented [**37**, p. 97]. The main root was attacked only if injured, with the wound extending to the vascular tissues, and only in the mature parts. The main root could, however, be colonized from infected rootlets, which were infected more readily if injured. In the vicinity of a wounded surface spore germination was stimulated, whereas on an intact root it was inhibited in comparison with suspensions on glass slides. Exudations from the injured roots, in particular glutamine, were responsible for the stimulation.

Ochse (J. J.). **A new Banana for Florida—Musa paradisiaca L., variety Hadja.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 340–341, 1958.

Writing from the University of Miami, Coral Gables, the author recommends this plantain var., resistant to Panama disease [*Fusarium oxysporum* f. *cubense*] and Sigatoka [*Mycosphaerella musicola*].

Herrera (V. C.), Guyot (H.), & Cuillé (J.). **Cercospora en Équateur.** [*Cercospora* in Ecuador.]—*Fruits d'outre mer*, **13**, 6, pp. 235–242, 11 fig., 1958.

Details are given of the methods now in use in Ecuador to control Sigatoka disease of bananas (*Cercospora* [*Mycosphaerella musicola*]), including spraying from the air, which are based on those adopted elsewhere [cf. **37**, pp. 362, 545].

Evans (S. G.). **Control of Banana leaf spot. Reports on trials with oil and other fungicides in Jamaica: 1955–57.**—9 pp., Plant Protection Ltd., Fernhurst Research Sta., England, 1957. [Mimeographed.]

In these investigations carried out under the direction of the Banana Board Research Dept, Jamaica, the method of Guyot and Cuillé for the control of *Mycosphaerella musicola* [cf. **37**, pp. 492, 545 *et passim*] was tested on var. Lacatan. The treatments were (1) 13 pints spray oil A+3 pints diesel oil+copper oxychloride (1½ lb. Cu/acre), (2) 2 gal. oil A+11 fl. oz. cuprous oxide in oil (¾ lb. Cu/acre); (3) 2 gal. oil A; (4) 4 lb. perenox+agral LN 36 ml./4 gal. water (which proved the best of several rates tried); (5) Bordeaux mixture 8:10:100+triton X 114; (6) 2 gal. spray oil B. All were applied at 7 sites and at 3-weekly intervals with a Motoblo sprayer, which was operated at high-vol. In each trial oil alone gave excellent control and both oils were equally effective. Addition of Cu as the oxychloride or oxide slightly enhanced the fungicidal effect, but increased phytoxicity. Perenox was not as effective as oil, but was nearly as good as Bordeaux, and was slightly improved by the agral. The oil sprays caused considerable scorching on leaves directly hit by the oil blast, the damage varying, however, with the age and rate of growth of the plants. Fruit was slightly spotted, but not commercially unacceptable unless it received a direct blast. Avoidance of such damage calls for greater skill and more careful supervision than with the application of Bordeaux mixture. The spraying machine should be directed backwards to leave the operator's hands free (as tiredness tends to result in misdirection of a held nozzle). One man could spray 1 acre in 15 min. with oil sprays and in 30 min. with perenox compared with approx. 4 man-hr./acre for standard Bordeaux spraying.

Diesel oil increased phytotoxicity, with no better result than spray oil alone. Oil spraying can retard leaf spot development after infection. Six applications to each row at 2 gal./acre every 10–14 days will eradicate severe leaf spot, after which the oil can generally be reduced to 1–1½ gal./acre, or the cycle lengthened, or only alternate rows sprayed.

Harkness (R. W.) & Malcolm (J. L.). **Iron chlorosis in Avocados.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 297–300, 1958.

At the Sub-Tropical Experiment Station, Homestead, experimental evidence was obtained that a chlorosis of avocado trees [cf. **36**, p. 255] on limestone soil in Dade County, Florida, can be corrected by the application of certain iron chelates. Severely affected trees should be given 50 g. Fe in the form of NaFe-DPTA or Fe-HEEDTA, with 50 gal. water/tree. The best material tested was chel. 138 H Fe (EDDHA), which corrected the condition in 2 or 3 weeks. The Fe content of the leaves of untreated trees ranged from an average of 38 p.p.m. for yellow trees to 48 p.p.m. for green ones.

Young (T. W.). **'Soft nose', a physiological disorder in Mango fruits.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 280–283, 1 fig., 1958.

'Soft nose' [cf. **36**, p. 807], a breakdown of the flesh on the ventral side and towards the apex of mangoes still attached to the tree, has now been reported from all mango-growing areas of Florida, in which it has caused considerable losses. Investigations have established with reasonable certainty that it is a physiological disorder. It generally, if not always, starts on the tree. Unless present at picking, it

does not develop (in a typical or pronounced form) afterwards. An external symptom, especially in var. Haden, is a yellowing of the green skin between the apex and the stigmal point, where there is also a lack of firmness. The flesh on the ventral side near the apex of some fruits merely appears to be over-ripe, while that round the shoulders and on the dorsal side is unripe. This is the condition most frequently found in Haden, and evidently it occurs mostly during the ripening which follows maturity. Occasionally in Haden but more commonly in Kent the over-ripe flesh surrounds a mass of yellowish to brown tissue of firmer texture. In a more advanced stage some of the tissue may become a spongy, greyish-black mass, sometimes extending through most of the fruit.

So far, the trouble has been found only in Indian vars., such as Mulgoba, and F_1 and F_2 seedlings of these, including Sensation, Keitt, Davis-Haden, Springfels, Irwin, Zill, and Brooks. Of the commercially important vars., Haden and Kent appear to be the most commonly affected; from 5 to 20% of harvested fruits of these will be affected in most seasons, and in a severe outbreak up to 50%.

TANI (T.). **Effects of phenolic compounds on mycelial growth of Gloeosporium kaki causing kaki anthracnose, and Bavendam's reaction of the causal fungus.**—*Tech. Bull. Fac. Agric. Kagawa Univ.* (formerly *Tech. Bull. Kagawaken agric. Coll.*), **8**, 2 (23), pp. 168–171, 1 graph, 1957. [Japanese. Abs. from English summary.]

Physiological studies of *G. kaki* [cf. **36**, p. 251] growing in synthetic media containing various phenolic compounds suggested that their fungitoxicity and enzyme oxidation may be adversely influenced by the ascorbic acid present in persimmon fruits.

SALERNO (M.). **Osservazioni sull' agente dell' 'occhio di pavone' dell' Olivo (Cycloconium oleaginum Cast.).** [Observations on the cause of 'peacock's eye' of Olive (*Cycloconium oleaginum* Cast.).]—*Ann. Sper. agr.*, N.S., **12**, 3, pp. 925–943, 12 fig., 1958. [English summary.]

In cultural studies [cf. **36**, p. 39] at the University of Catania, Sicily, *C. oleaginum* conidia from young spots were streaked over a glucose agar-decoction of olive leaves (unadjusted pH 5·2) and incubated at 15–20° C. After 4–5 days germinated conidia were transferred to tubes of the same medium and kept at under 22°. The fungus sporulated readily in young cultures, the conidia later germinating and disappearing. Biometrical comparisons of conidia showed greater differences among monoconidial isolates than in natural populations.

ZACHOS (D. G.). **Une bactériose des Olives.** [A bacteriosis of Olives.]—*Ann. Inst. phytopath. Benaki*, N.S., **1**, 2, pp. 118–119, 2 fig., 1957.

Table olives from Pelion and other areas of Greece bore circular spots, 0·5–2·5 mm. diam., round the lenticels, eventually with a halo. The lesions were superficial and only disfigured the fruit, 50% being affected on some trees. *Pseudomonas* sp. was isolated at the Phytopathologic Station, Volos, and caused similar damage to fruit on reinoculation. Oil olives were similarly affected in the Peloponnese and a like condition is reported from Crete.

HUDSON (H. J.) & WEBSTER (J.). **Succession of fungi on decaying stems of Agropyron repens.**—*Trans. Brit. mycol. Soc.*, **41**, 2, pp. 165–177, 1 fig., 15 graphs, 1958.

In further studies at Sheffield University, stems of *A. repens* during 19 months after flowering showed a similar pattern of fungal distribution to that on *Dactylis glomerata* [**36**, p. 592].

Walker (J.). **A new species of Claviceps on Phalaris tuberosa L.**—*Proc. Linn. Soc. N.S.W.*, **82** (*1957*), 3, pp. 322–327, 1 pl., 1 fig., 1958. [18 refs.]

In the last 4 years seed samples of *P. tuberosa* received at the Seed Testing Laboratory, N.S.W., have contained sclerotia of *C. phalaridis* Walker. Though apparently widespread the fungus has not yet been found in the field. When placed on wet sand away from direct light the sclerotia germinated to give ascostromata. *C. phalaridis* differs from *C. purpurea*, the only other species found on *P. tuberosa*, in having fawn coloured sclerotia paling to cartridge buff at the base, 1·5–2·5 × 1–2 mm., spherical to oblong and slightly flattened; the conidia are straight or slightly curved, oblong to cylindrical, 5·5–15 × 2–4 μ; and the asci 130–270 × 4 with ascospores 125–240 μ long.

Ramamurthi (C. S.), Ross (A. F.), & Roberts (D. A.). **Use of Gomphrena globosa in quantitative work with Red Clover vein mosaic virus.**—*Phytopathology*, **48**, 6, pp. 336–337, 1 fig., 1 graph, 1958.

At Cornell University, Ithaca, New York, red clover vein mosaic virus [**37**, p. 296] produced typical local necrotic lesions on *G. globosa* inoculated mechanically with sap from infected clover. With aqueous dilutions of the sap near 10^{-2} differences in infectivity as small as 20% could be detected consistently.

O'Loughlin (G. T.). **Clover stunt virus : a resistant variety of Subterranean Clover.** *J. Dep. Agric. Vict.*, **56**, 6, pp. 385–387, 393, 3 fig., 1958.

Clover stunt virus disease, reported from different localities in Australia since 1956 [cf. **35**, p. 878; **36**, p. 248] on clovers and other legumes, caused 80–90% crop losses in some stands in Victoria. The virus has now been transmitted mechanically by wedge grafting a stem tip; seed transmission is unlikely, as the affected plants fail to set seed. Under glasshouse conditions symptoms appear 9 -12 days after feeding infective aphids (*Aphis craccivora* and *Myzus persicae*) on the plants for 2–3 days. The aphids remain infective for very long periods. In field trials the subterranean clover var. Tallarook possessed a high degree of resistance, some plants being immune, while some European vars. showed varying degrees of resistance; it may therefore be possible to breed immune vars. for further use. Broad bean var. Longpod was susceptible.

McEwen (F. L.), Schroeder (W. T.), & Davis (A. C.). **Host range and transmission of the Pea enation mosaic virus.**—*J. econ. Ent.*, **50**, 6, pp. 770–775, 1957.

In further work at the New York State Agricultural Experiment Station, Geneva [**35**, p. 806], pea enation mosaic virus was recovered by pea aphids (*Macrosiphum* [*Acyrthosiphon*] *pisi*) from all or practically all seedlings of crimson clover, hairy vetch (*Vicia villosa*), and common vetch (*V. sativa*) exposed 3 weeks previously to infectious aphids. With lucerne (5 vars.) only about 12% of exposed seedlings became infected, and similarly with Alsike clover, Ladino clover, wild white clover, and yellow sweetclover (*Melilotus officinalis*). White sweetclover (*M. alba*) was intermediate. To determine the accessibility of the virus in these hosts, an infected plant of each sp. or var. from the above experiment was colonized for 48 hr. with 50–75 young, adult, non-viruliferous aphids which were then indexed in groups of 5 on healthy pea plants (48 hr. feed). The results indicated that the relative accessibility of the virus in these hosts closely paralleled the ease with which they had acquired the infection.

Tabulated results are given of experiments in which young adult aphids of the summer form, raised on healthy pea plants, were starved for 30 min. before acquisition feeding periods of 2 min.–48 hr. and then fed for a range of times on indicator pea plants. The minimum acquisition period was 2 hr.; 5 min. feeding could produce infection, the minimum total transmission period being 24 hr.

Aphids were able to acquire an infective dose of virus from pea plants within 3 days of the infestation of those plants by viruliferous aphids, though visible symptoms did not appear for 7–9 days. Parathion residues on pea plants were ineffective in reducing aphid infestation.

HELMS (KATIE). **Witches' broom disease of Lucerne. III. A greenhouse study of symptom expression and growth in relation to frequency of watering and cutting.** —*Aust. J. agric. Res.*, **9**, 3, pp. 319–327, 2 pl., 1 graph, 1958.

At the Division of Plant Industry, Canberra, clones of 2 strains of lucerne naturally infected by witches' broom virus [**36**, p. 650 and below] and one of non-infected lucerne were given combinations of 2 rates of watering (soil moisture between wilting point and field capacity or between 80 and 100% field capacity) and 2 frequencies of cutting (6 and 12 weeks). The treatments markedly affected the growth of the diseased plants, but only slightly that of non-infected. The symptoms maintained their characteristic forms in all 4 treatments, but were consistently most severe in drier soil and with more frequent cutting.

In the spring, when masking normally occurs in the field, some diseased plants of one strain, grown at high soil moisture and cut every 12 weeks, showed partial masking of symptoms, and though the winter greenhouse temps. were high enough to prevent dormancy the duration of daylight or light intensity may be associated with masking. The omission of winter dormancy may account for failure to develop complete masking of symptoms; low winter temps., which reduce the growth rate and lead to an accumulation of reserves, may temporarily increase tolerance of the disease. Further, the clones were developed from old, diseased plants and may have been less sensitive to cultural treatments than would clones from recently infected plants. The weakening effect of frequent cutting would probably be intensified, as starch reserves are reduced or absent in the crowns of severely affected plants.

WALKER (A. J. K.). **Lucerne—pests and diseases.**—*J. Dep. Agric. S. Aust.*, **61**, 10, pp. 476–480, 3 fig., 1958.

Witches' broom virus disease [**34**, p. 515 and above] is responsible for some serious losses in the summer crop, which may recover or be killed by secondary diseases. Many pasture plants and weeds act as carriers, and no practicable control means are known [cf. **32**, p. 564]. Downy mildew (*Peronospora trifoliorum*) [**36**, p. 454] and leaf spot (*Pseudopeziza medicaginis*) [loc. cit.] cause no severe damage and can be controlled by cutting or grazing. Spring black stem (*Ascochyta imperfecta*) [map 263] occurs in patches only and is more common in the lower S.E.

TALBOYS (P. W.). **Some mechanisms contributing to Verticillium-resistance in the Hop root. Degradation of cellulose by Verticillium albo-atrum. Association of tylosis and hyperplasia of the xylem with vascular invasion of the Hop by Verticillium albo-atrum.**—*Trans. Brit. mycol. Soc.*, **41**, 2, pp. 227–241, 2 pl.; pp. 242–248, 1 pl., 5 graphs; pp. 249–260, 2 pl., 1 fig., 1958.

In further research at East Malling Research Station [cf. **37**, p. 439] the reactions of the hop cultivar OR/55 tolerant of virulent and mild strains of *V. albo-atrum* and the sensitive Fuggle were studied; observations on host-parasite interactions in the determinative phase [**37**, p. 177] are described in detail. Invasion of the host may be retarded at the outset by lignification of cell walls and occlusion of penetrating hyphae by sheathing deposits in the epidermal and cortical cells to an extent determined by the virulence of the parasite. Exclusion of the fungus from the stele apparently depends on suberization of the endodermis, which is much more commonly associated with invasion of the cortex in tolerant than in sensitive cultivars.

The defence mechanism in the hop is of a type found in other plants, related, it is suggested, to the presence of foreign organisms that represent a transitional stage

in the evolution of obligate parasites and symbiotic saprophytes, a sequence associated with progressive delay in host-tissue necrosis and perhaps reflecting progressive reduction of the secretory and synthetic potentialities of these organisms.

In the 2nd paper is reported the secretion of a cellulase system by the fungus in liquid media containing cellulose or cellobiose as the sole C sources. The system reduced the viscosity of methyl cellulose solution and broke down cellulose into component reducing substances. The presence of dextrose, sucrose, starch, and lactose inhibited secretion as did peptone at 0·5% or more. Sodium nitrate proved a sufficient N source over a wide range of concs. Progressively less degradation of cellophane membranes occurred with increasing conc. of dextrose, though some delamination still took place. It is suggested that the presence of sugars, starch, etc. in roots invaded by *V. albo-atrum* can inhibit cellulase production and general cell-wall destruction, though traces of cellulase still aid fungal penetration.

Some of the information reported in the 3rd paper has been noticed [**36**, p. 126]. Apparently, tylosis is stimulated by the presence of small amounts of mycelium and low conc. of the metabolites secreted by the pathogen but is inhibited by higher conc. Tylosis and hyperplasia are also induced in the hop by *V. dahliae* and other fungi and by wounding. Leaf necrosis and the preceding chlorosis and browning of mesophyll cells adjacent to terminal tracheidal elements are probably due to fungal toxins in both mild and acute syndromes. The determinative phase probably ends when the intensity of primary vascular invasion following extravascular host-parasite interaction determines whether tylosis formation will be stimulated or depressed; whichever condition is established, it tends to be self-perpetuating.

Golenia (A.). **Rdza Mięty (Puccinia menthae Pers.) w warunkach centralnej Polski. II. Bio-ekologiczne obserwacje pasożyta i rośliny-gospodarza, jako podstawa prognozy i wyboru metod zwalczania choroby na wiosnę. III. Badania nad przydatnością metody cieplnego odkażania sadzonek Mięty.** [Mint rust (*Puccinia menthae* Pers.) in central Poland. II. Bio-ecological observations of host and pathogen as a basis for prognosis and choice of control methods in spring. III. Researches on the heat disinfection of Mint seedlings.] —*Biul. Zak. Hod. Roś. Leczn.*, *1957*, 10 pp., 1 graph; 8 pp., 1957. [Russian and German summaries].

In continuation of this series, part I of which [**37**, p. 244] was entitled 'Researches on morphology and symptoms', the author reports that the massive teleutospore germination of *P. menthae* and infection of peppermint coincide with the spring rainy season (air temp. 8° C., soil temp. 6°), and with the onset of growth. Fungus mycelium and aecidiospores in the tissues could be killed by 10 min. immersion in water at 41–43°, while 38° was sufficient to kill teleutospores. The treatment was not harmful to cuttings.

Broeshart (H.), Ferwerda (J. D.), & Kovachich (W. G.). **Mineral deficiency symptoms of the Oil Palm.**—*Plant & Soil*, **8**, 4, pp. 289–300, 3 pl. (1 col.), 1957.

Presenting the results of 3 years' studies in the Belgian Congo the authors describe a sand-culture experiment in which young oil palms developed symptoms of N, K, and Mg deficiency involving, respectively, a homogeneous yellowing, a marginal yellowing, and an orange chlorosis of the leaflets. All these deficiencies caused poor growth and reduction of root development. P deficiency induced no symptoms, while S deficiency caused yellowing of young leaves and interveinal chlorosis and necrosis. Further work showed that little leaf disease [cf. **37**, p. 366] is caused chiefly by B deficiency in the southern parts of the Belgian Congo. Insufficiency of available N, K, Mg, or B also adversely affects the production of inflorescences.

Plant failure [cf. **34**, p. 719] appears to be due to a poorly developed rooting system, which may result from a deficiency of Mg, B, or, possibly, K.

Confluent orange spotting [cf. **36**, p. 402] is comparatively rare in the country, and its distribution does not appear to be related to soil conditions. It was not induced by omission of K and leaf analyses gave no indication of K deficiency.

McKay (R.). **A retrospect of fifty years' outbreaks of Potato blight in Ireland, 1907–1956.**—*J. Dep. Agric. Eire*, **53** (*1956–7*), pp. 5–10, 1 graph, 1 map, [? 1958].

A tabulated record, believed to be unique, of the annual outbreaks (except for 1921) of *Phytophthora infestans* is presented. They usually started in the maritime counties, and occurred in 1 year before the end of April, in 16 years before the end of May, in 33 by 7 June, and in 40 by 15 June. In 9 years blight was delayed until later in June (in 6 during the last week).

Björling (K.) & Sellgren (K. A.). **Besprutningstekniska försök mot potatisbladmögel (Phytophthora infestans (Mont.) De By). III. Studier av skyddseffekten vid olika sprutsätt.** [Spraying techniques against late blight (*Phytophthora infestans* (Mont.) De By). III. Studies on the protection afforded by different spray methods.]—*K. Landtbr Akad. Tidskr.*, **96**, pp. 191–199, 1957. [English summary.]

In a special trial at the Kungl. Lantbrukshögskolan, Uppsala, Sweden, with Bordeaux mixture limited (by painting) to either the upper or lower surfaces of potato leaves, the protection against *P. infestans* [**33**, p. 175; **35**, p. 321] was unsatisfactory and very similar irrespective of which surface was treated. Better protection was obtained by treating both leaf surfaces. In 15 field trials comparing Bordeaux spraying from above with combined spraying from above and below the differences in protection were on the whole insignificant. However, on some vars. with a more open growth, such as King Edward, spraying from above was somewhat better, while on vars. with a closed type of growth, such as Bintje, combined spraying was more effective. Analyses of the Cu deposits on the top and bottom leaves showed that the loss of spray fluid to the ground was larger with combined spraying; with spraying from above there were significant differences between vars. in the distribution on top and bottom leaves, e.g. on King Edward it was fairly even (55% on the top and 45% on the bottom leaves) but not on Bintje (65 and 35%). Combined spraying gave a relatively even distribution on both vars., but depositing somewhat more than half the volume on the bottom leaves.

Björling (K.) & Sellgren (K. A.). **Protection and its connection with redistribution of different droplet sizes in sprays against Phytophthora infestans.**—*Lantbr-Högsk. Ann.*, **23**, pp. 291–308, 3 fig., 3 graphs, 1957.

At the Institute of Plant Pathology and Entomology, Uppsala, Sweden, some common fungicides were applied in different droplet sizes and increasing volumes to detached potato leaflets with an air-atomizer; they were then infected by defined zoospore suspensions of *P. infestans* and the number of primary necrotic spots used as a measure of infection. The best results were obtained in both laboratory and field on whole plants with commercial sprayers by the smallest droplets (mass median diam. 55 μ), which gave almost complete protection at relatively low volumes.

The influence of rain or dew on the efficiency of droplet sizes was studied by applying 1 or 2 artificial rains between spraying and infection. Bordeaux applied in large droplets and high volumes did not appear to be significantly affected by rain, whereas protection by small droplets in low volumes was definitely improved

by rain or dew, probably owing to redistribution of the Bordeaux particles to unprotected leaf areas. Similar trials with zineb gave irregular results, but in most cases rain lessened the degree of protection, indicating that this fungicide is more easily washed off and is not redistributed.

The lowest volumes used in the laboratory trials (50–200 l./ha.) refer to treatment of single leaflets and are therefore most closely comparable with medium and high volume sprays in the field where the total leaf area is several times larger than the crop area.

Gallegly (M. E.) & Galindo (J.). **Mating types and oospores of Phytophthora infestans in nature in Mexico.**—*Phytopathology*, **48**, 5 (1), pp. 274–277, 2 fig., 1958.

A more detailed account from the West Virginia University, Morgantown, and the Rockefeller Foundation, Mexico, of information already noticed on *P. infestans* on potato and *Solanum* spp. [**36**, p. 549; cf. **37**, p. 503].

Lee (Shu-Fung) & Le Tourneau (D.). **Chlorogenic acid content and Verticillium wilt resistance of Potatoes.**—*Phytopathology*, **48**, 5 (1), pp. 268–274, 1 fig., 1 graph, 1958.

In further studies at the University of Idaho, Moscow [cf. **37**, p. 139], using 7 vars. of potato and chromatographic methods of assay, chlorogenic acid was found to be present in the roots, to a somewhat greater extent in the leaves, and in trace amounts in the stems of potatoes; more occurred in roots of the vars. resistant to *V. albo-atrum* than in those of the susceptible. Comparative *in vitro* experiments with media initially acid in reaction showed that while catechol was markedly inhibitory to the pathogen at 10^{-3} M, chlorogenic acid at the same conc. was not, and caffeic acid was intermediate. Chlorogenic acid might serve as a C source for the fungus. Penicylinder assays on solid media showed chlorogenic acid to be more inhibitory in neutral or alkaline media and in the quinone form than in the acid form, though even at high pH large quantities (500–1000 p.p.m.) of the acid were needed to inhibit growth.

Błaszczak (W.). **Badania nad Rizoktoniozą Ziemniaków. I. Badania nad Rizoktoniozą Ziemniaków (Rhizoctonia solani K.) ze szczególnym uwzględnieniem jej zwalczania. II. Badania porównawcze 25 szczepów Rhizoctonia solani K. zebranych z ziem Polski.** [Studies on rhizoctoniosis of Potatoes. I. Studies on rhizoctoniosis of Potatoes (*Rhizoctonia solani* K.) with special consideration of its control. II. Comparative studies of 25 strains of *Rhizoctonia solani* K. collected in Poland.]—*Prace Kom. Nauk roln. leśn., Poznań*, **4**, 4, pp. 1–78; 79–114, 6 pl., 12 fig., 2 diag., 10 graphs, 1 map, 1958. [English summaries.]

The 1st part describes investigations already noticed [**35**, p. 222] and further tests in 1952 and 1953. Treatment of tubers with 0·1% $HgCl_2$ in autumn was more effective than in spring. Delaying harvesting by 6 weeks increased the sclerotia-bearing tubers by 48·8%. The 25 isolates of *R.* [*Corticium*] *solani* from potato tubers described in part II showed a wide variance in pathogenicity and distinct morphological and cultural differences.

Zachos (D. G.). **The brown rot of Potatoes in Greece.**—*Ann. Inst. phytopath. Benaki*, N.S., **1**, 2, pp. 115–117, 3 fig., 1957.

Symptoms of this disease, which caused considerable damage, were recorded from Central Greece in 1951, Naxos island in 1953, and southern Peloponnese and the neighbourhood of Athens in 1957, the causal organism being identified in the last 2 cases as *Pseudomonas solanacearum* [map 138].

Rankin (H. W.) & Girardeau (J. H.). **Transmission by Myzus persicae (Sulz.) of the internal cork virus of Sweetpotatoes.**—*Plant Dis. Reptr*, **42**, 5, pp. 581–582, 1958.

At Tifton, Georgia, *M. persicae* transmitted sweet potato internal cork virus to 17 of 53 healthy sweet potato plants growing with infected ones in a mesh cage. Root symptoms developed [cf. **36**, p. 786 and below].

Kantack (E. J.), Martin (W. J.), & Newsom (L. D.). **Transmission of internal cork of Sweet Potato by the cotton aphid Aphis gossypii Glover.**—*Science*, **127**, 3312, p. 1448, 1958.

In field studies initiated in 1955 at the Departments of Entomology Research and Plant Pathology, Louisiana State University, *Aphis gossypii* and *A. medicaginis* were the aphid spp. 'coinciding in greatest numbers' with internal cork virus infection in sweet potato crops [cf. above]. When caged on sweet potato leaves *A. medicaginis* died off within 24 hr., but *A. gossypii*, though distressed and incapable of reproduction, survived for 7–10 days. In further tests the latter transmitted the disease (with induced root lesions) from affected to virus free plants of Unit 1 Porto Rico. There was evidence that the conc. of the virus must reach a high threshold level before lesions develop extensively in the roots.

Gondo (M.) & Kubo (T.). **Effect of some fungicides on Helicobasidium mompa Tanaka in soil.**—*Bull. Fac. Agric. Kagoshima Univ.* 6, pp. 101–107, 1957. [Japanese. Abs. from English summary.]

The effects of methoxyethyl mercuric chloride, phenyl mercuric urate, ethyl mercuric phosphate, and *n*-methyldithiocarbamate hydrate on *H. mompa* [**37**, p. 557] in different soils were investigated. The results indicated a decrease in fungicidal effect except in sand owing to adsorption by soil particles.

Wijbrans (J. R.) & Tong (T. H.). **Nieuwe wegen ter bestrijding van djamur upas.** [A new method for the control of pink disease.]—*Bergcultures*, **26**, 19, pp. 465, 467, 468, 1957. [Indonesian and English summaries.]

To control *Corticium salmonicolor* on rubber [cf. **34**, p. 544] lesions on young trees should be sprayed with Bordeaux mixture (3–5% $CuSO_4$) or copper oxychloride (2–3%), with a sticker: those on productive trees with emulsions of tar derivatives such as izal or white septol (5–7%) in water or 0·5% fylomac 90, also with a sticker. Dead wood should be cut out in dry weather after spraying, burnt, and the wounds treated with a mixture of petrolatum and izal (5–7·5%) or other tar derivative. This method is more rapid, costs less, and gives better results.

Antoine (R.). **La production de boutures saines dans la lutte contre la maladie du rabougrissement des repousses de la Canne à sucre à l'île Maurice.** [The production of healthy cuttings in the control of ratoon stunting disease of Sugarcane in Mauritius.]—*Rev. agric. sucr. Maurice* (formerly *Rev. agric. Maurice*), **37**, 1, pp. 8–13, 2 diag., 1 map, 1958.

The methods for the control of this disease are set out in detail [cf. **36**, p. 617]. There are 3 main features, production of resistant varieties, prophylactic treatment of implements, and hot water treatment of cuttings, the apparatus for carrying out the last on a large scale being described.

Sarmah (K. C.). **Diseases in relation to environment.**—*Two & a Bud* (*News Lett. Tocklai exp. Sta.*), **4**, 4, pp. 14–16, 1957.

The author divides tea diseases into those wholly or partially related to regional and those influenced mainly by local environment. To the first category belongs blister blight (*Exobasidium vexans*), requiring a cold, wet or misty climate with

reduced hours of mild sunshine, and to which temps. above 90° F. and bright sunshine are lethal. Thorny blight (*Aglaospora* sp.) [cf. **36**, p. 618], a secondary stem disease widespread in N.E. India, is more prevalent at higher altitudes but red rust (*Cephaleuros parasiticus*), black rot (*Corticium theae* and *C. invisum*) [**36**, p. 556], thread blight [*Marasmius pulcher*: **27**, p. 261; **37**, p. 458], branch canker [*Poria hypobrunnea*], and violet root rot (*Sphaerostilbe repens*) [**27**, p. 260] are favoured by warm and wet conditions and are more prevalent in the plains. Black root rot (*Rosellinia arcuata*) [**34**, p. 489] is found more often at higher altitudes, but brown root rot (*Fomes lamaoensis*) [*F. noxius*: loc. cit.] occurs more usually in the plains, where its distribution differs somewhat from that of tarry root rot (*Hypoxylon asarcodes*) [**36**, p. 618].

To the second category belong *Nectria* sp. [loc. cit.], which requires fresh wounds for initial infection, and *Rhizoctonia bataticola* [*Macrophomina phaseoli*] and *Diplodia* sp., widespread in N.E. India, which depend on debility for invasion. Furthermore, black rot remains dormant in winter in sclerotial form. *P. hypobrunnea* and *Macrophoma theicola* [**36**, p. 131] are more prevalent in the plains in sites where tea is subject to extreme dry or wet conditions, or to sun scorch.

Owen (P. C.). **Photosynthesis and respiration rates of leaves of Nicotiana glutinosa infected with Tobacco mosaic virus and of N. tabacum infected with Potato virus X. Some effects of virus infection on leaf water contents of Nicotiana species.**—*Ann. appl. Biol.*, **46**, 2, pp. 198–204; pp. 205–209, 1958.

In further studies at Rothamsted Experimental Station [cf. **37**, p. 246] the rates of respiration and photosynthesis of White Burley tobacco leaves sap inoculated with potato virus X remained unaffected until symptoms developed, when the respiration rate rose by over 30% and the photosynthesis rate declined by 20%. When local lesions formed on the leaves of *N. glutinosa* inoculated with tobacco mosaic virus (but not before), the respiration rate increased by an amount (rising to 30%) which varied with the number of lesions, and the photosynthesis rate by 20%.

These results differ from those reported for tobacco leaves infected by tobacco mosaic virus, in which both respiration and photosynthesis were affected within 1 hr. of inoculation. The evidence indicates a fundamental difference between the behaviour of the same virus in different hosts. This can be explained by assuming either that tobacco mosaic virus passes from the epidermis to inner tissues much more rapidly in tobacco leaves than has hitherto been thought possible, or that the virus is confined to the epidermis but is able to affect the metabolism of tissues distant from it. As this virus is confined to the epidermis of *N. glutinosa* leaves at this period without detectably affecting the chlorenchyma, the former explanation appears to be the more reasonable.

Arguments based on the extrapolation of the results obtained with other viruses on tobacco or with tobacco mosaic virus on other plants to tobacco leaves infected by tobacco mosaic virus, without direct measurements to confirm them, are of doubtful validity. Probably the converse is true, and false assumptions may have resulted from the fact that much of the early work on plant viruses was conducted on tobacco mosaic virus in tobacco leaves.

In the 2nd series of experiments inoculation with tobacco mosaic virus decreased the water content attained by detached tobacco leaves on keeping for 20 hr. in conditions of minimum water stress, the decrease being greater when the plants were kept in light before inoculation than when they were kept in darkness. No such effects of infection during the 1st day after inoculation were obtained with tobacco leaves inoculated with tobacco etch virus or potato virus X, or with *N. glutinosa* leaves and tobacco mosaic virus.

The results suggest that inoculation with tobacco mosaic virus affects leaf tissues

deeper than the epidermis earlier in tobacco than in other leaves, and earlier than other viruses in tobacco leaves.

Goodchild (D. J.), Cohen (M.), & Wildman (S. G.). **The specific activity of Tobacco mosaic virus as a function of age of infection.**—*Virology*, **5**, 3, pp. 561–566, 3 graphs, 1958.

At the Dept of Botany, University of California, Los Angeles [cf. **37**, p. 355], the authors determined the specific activity of the common strain of tobacco mosaic virus during synthesis in directly inoculated Samsun tobacco leaves by comparing the amount of virus as estimated by infectivity on *Nicotiana glutinosa* with that as determined by electrophoresis and electron microscopy. From 3–30 days after inoculation the specific activity seemed to remain constant.

Tomaru (K.) & Hidaka (Z.). **On the Tobacco mosaic virus contained in manufactured Tobacco.**—*Ann. phytopath. Soc. Japan*, **22**, 2, pp. 65–69, 3 fig., 3 graphs, 1957. [Japanese. Abs. from English summary.]

Extracts from different types of manufactured tobacco were rubbed with carborundum on tobacco seedling leaves: a very high percentage showed mosaic symptoms in each case [cf. **37**, p. 310]. Local lesion tests indicated that there were no consistent differences in virus concentration in the different types of tobacco.

Hirai (T.), Shimomura (T.), Yamaguchi (A.), Matsui (C.), & Nishikawa (Y.). **Studies on the chemotherapy for plant virus diseases. I. Screening tests of the new antibiotics for their effect on TMV multiplication in Tobacco leaf.**

Shimomura (T.), Nishikawa (Y.), & Hirai (T.). **II. Screening tests of the new antibiotics by leaf spraying method.**—*Ann. phytopath. Soc. Japan*, **22**, 2, pp. 70–74, 2 graphs; 4–5, pp. 260–264, 1 fig., 1 graph, 1957. [Japanese. Abs. from English summaries.]

In further experiments [cf. **37**, p. 419] tobacco leaves inoculated 1 day previously with tobacco mosaic virus were floated on solutions of the antibiotics under a fluorescent lamp at 20–25° C. and after 3–4 days the conc. of the virus was determined colorimetrically with the Folin reagent. Of the 62 antibiotics tested, 24 produced at least 20% virus inhibition; antibiotic 62 gave 58% and noformocin and 8-araguanine gave 39 and 32%.

In the 2nd set of tests virus-infected tobacco leaves were sprayed with antibiotics effective in the 1st trial and then analysed for the virus protein content. Of the 18 used, 3 induced more than 20% virus inhibition. Comparison of virus protein analysis and local lesion assays threw some doubt on the validity of the latter method of measuring virus activity.

McGrath (Hilde) & Miller (P. R.). **Blue mold of Tobacco.**—*Plant Dis. Reptr, Suppl.* 250, 35 pp., 1 fig., 1 graph, 1 map, 1958. [200 refs.]

A detailed account from Beltsville, Maryland, of tobacco downy mildew (*Peronospora tabacina*) [**37**, p. 510] in the United States. An introductory section, dealing with nomenclature and distribution, is followed by sections on the history of the disease, spread in U.S.A. and Canada, epidemiology, etiology [see below], symptoms, cultural practices, controlling fungicides, and resistant varieties.

In 1957 the disease was reported for the first time in Cuba [map 23] on cigar-wrapper tobacco which suffered high losses. It spread over 100 miles.

Cruickshank (I. A. M.). **Environment and sporulation in phytopathogenic fungi. I. Moisture in relation to the production and discharge of conidia of Peronospora tabacina Adam.**—*Aust. J. biol. Sci.*, **11**, 2, pp. 162–170, 8 graphs, 1958.

In this expanded account [cf. **36**, p. 733] it is shown that diffusion pressure deficit

(D.P.D.) and R.H. were of critical importance to the sporulation of *P. tabacina* [cf. **21**, p. 498; **37**, p. 376]. The threshold values for max. sporulation were 2·6 atmos. and 97%, respectively. Minor deviations towards a higher D.P.D. or a lower R.H. significantly reduced sporulation intensity.

Sporulation requires a min. period of 3 hr. of opt. conditions at daybreak; light is involved [cf. **16**, p. 627] but its effect appears to be indirect. In addition, there is a stage of conidiophore development which is entirely dependent on favourable humidity. The incubation period for sporulation includes a relatively long one of conidiophore growth and a short one of conidia formation and maturation. No simple relationship was found to exist between the onset of opt. humidity and the time of sporulation. The min. period of 3 hr. need not occur before 5 a.m. if the conditions remain optimal beyond 8 a.m. No significant difference was observed in sporulation intensity at 8 a.m. irrespective of the duration of exposure of leaf disks to opt. R.H. Sub-min. periods of opt. humidity on consecutive days were non-cumulative, and exerted no positive effect on sporulation. Changes in R.H. and also mechanical shock (a 1 g. weight dropped on to the Petri dish lid containing the leaf disk from heights of 5–60 mm.) induced conidial discharge.

YEN (J. W.). **Study on Tobacco diseases in Taiwan II. Frog eye diseases of Tobacco (1).**—*J. Agric. For.* (*Taiwan*), **5**, pp. 128–144, 5 fig., 2 graphs. 1956. [Chinese. Abs. from English summary. Received 1958.]

A detailed account of frog eye (*Cercospora nicotianae*) on tobacco in Formosa [cf. **26**, p. 422]. Two types of lesion were observed, the normal round spots with a grey-white centre and brown perimeter, and abnormal irregular, uniformly brown lesions, producing more conidia. The opt. temp. for growth of the fungus was about 30° C., min. 7°, and max. 37°.

STEPHEN (R. C.). **Barn-rot disease of flue-cured Tobacco in Southern Rhodesia.**—*Emp. J. exp. Agric.*, **26**, 103, pp. 247–253, 1 graph, 1958.

In preliminary experiments at the Tobacco Research Board, Southern Rhodesia, on the effect of factors associated with the curing environment on the development of barn rot (*Rhizopus arrhizus*) [cf. **37**, p. 134] during the colouring period, var. Delcrest was used; potato dextrose agar cultures, separated from the agar and fragmented with distilled water in an Ato-mix blender, served as inoculum. The butts were dipped in it and the leaves were suspended, 4 together, from thin, flat, metal 'needles' $\frac{1}{2}$ in. wide, which pierced the midrib 3–4 in. from the butt end.

The onset of the disease became more rapid and the subsequent damage greater as the yellowing temp. rose from 80 to 110° F. and when the R.H. was increased from 50 to 100%. These factors operated independently.

The more mature the leaf at reaping, the quicker was the onset of the disease. Rather more damage occurred on immature than on over-ripe leaves, possibly because the former took longer to yellow.

BERKELEY (G. H.) & RICHARDSON (J. K.). **Tomato diseases.**—*Publ. Dep. Agric. Can.* 759 (*1957*), 22 pp., 4 pl., 1958.

Part I of this revised edition [cf. **24**, p. 78] deals with the causes and prevention of tomato diseases in general, soil sterilization, and spraying in the field. Part II reviews individually the fungal, bacterial, virus, and non-parasitic diseases and those of obscure origin.

MALCOLM (J. L.) & HARKNESS (R. W.). **Irrigation experiments with Tomatoes on a Rockdale soil.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 126–133, 1 graph, 1958.

In experiments at the Sub-Tropical Experiment Station, Homestead, Florida, when one of the regular spray applications, which should have been made on about

24 Dec., was omitted on some tomato rows, late blight [*Phytophthora infestans*] caused serious damage, particularly on plants given 1 in. of water 3 times a week in contrast to 0, 0·5, 1, or 2 in. once or twice a week. Adjoining plots on either side also had a high incidence of infection, but other plots in the same row were only moderately affected. Blight was also severe on an irrigated plot where plastic was used to separate the top soil from the rock. It is concluded that irrigation significantly affected disease control.

KALYANASUNDARAM (R.). **Production of fusaric acid by Fusarium lycopersici Sacc. in the rhizosphere of Tomato plants.**—*Phytopath. Z.*, **32**, 1, pp. 25–34, 2 fig., 2 graphs, 1958. [German summary.]

At the Eidgenössischen Technischen Hochschule, Zürich, it was found that in fresh acid soil about 20% of the fusaric acid added could be detected at the end of 10 days incubation. It was possible to detect approximately 7·5 μg. and 11·25 μg. of fusaric acid/plant in the sand and soil rhizosphere, respectively, of 20-day-old Tuckswood tomato plants infected by *F. lycopersici* [**35**, p. 554].

BURGIS (D. S.) & OVERMAN (A. J.). **Chemicals which act as combination herbicides, nematocides and soil fungicides : I. Effect on field-seeded Tomatoes.**

OVERMAN (A. J.) & BURGIS (D. S.). **II. Effect on soil microorganisms.**—*Proc. Fla hort. Soc.*, **70** (*1957*), pp. 137–139, 139–143, 1958.

In an experiment at the Gulf Coast Experiment Station, Bradenton, with fumigants applied before planting to spring tomato beds [cf. **36**, pp. 633, 806] *Pellicularia* [*Sclerotium*] *rolfsii* appeared in the field late in the season. Untreated plots suffered a 40% loss of plants while those given DD+AA (allyl alcohol: 3½ lb.+7 gal., injected per 9,600 ft. row) or ethyl dibromide W 85+AA (1½+7) had only 11% and 16% loss, respectively.

Population studies of *Trichoderma* and *Fusarium* in treated soils indicated that vapam–4S, crag mylone 40 WP (both 50 lb. at one injection or split), AA+DD (7+7 gal. injected or split), and drenches (7 gal.) of AA or AA+V–C 13 (7+2) were all effective fungicides. In spring vapam (50 lb./acre), crag mylone, and AA, alone and mixed with EDB or DD, reduced the numbers of colonies of *Fusarium* for at least 61 days; EDB alone also reduced the fungal populations. The mixtures appeared to increase the fungicidal ability of AA.

Invariably the soil treatments which proved to be the best herbicide-nematocide-fungicides produced the greatest yields. In autumn the herbicide-fungicide drenches (7 gal.) with MR 3908 and AA also gave high yields.

ZACHOS (D. G.) & GEORGOPOULOS (S. G.). **The bacterial canker of Tomatoes in Greece.**—*Ann. Inst. phytopath. Benaki*, N.S., **1**, 2, pp. 98–102, 8 fig., 1957.

In Preveza, N.W. Greece, in 1957, tomatoes were attacked for the first time by *Corynebacterium michiganense* [map 26], causing considerable damage in the spring. The symptoms, etiology, and epiphytology of the disease, which is believed to have been in the area for at least 4 yr., are described.

HÅRDH (J. E.). **Om topprötans fysiologiska bakgrund hos Tomat.** [On the physiological background of Tomato blossom-end rot.]—*Nord. JordbrForskn.*, **39**, pp. 432–448, 2 fig., 1957. [English summary.]

At the Horticultural Research Institute, Piikikiö, Finland, the injection into unripe tomato fruits over a 3–5 week period of 100 ml. 0·025 M succinic or malonic acid or 0·3 M oxalic acid resulted in the formation of brown-walled internal cavities but no extensive necroses, the latter being consistently associated with fungal or bacterial infection. A few fruits also reacted by cavity development to the injection of tartaric (0·3 M), oxalacetic, *cis*-aconitic, and α-ketoglutaric (all at 0·025) acids.

In potted Potentate plants with soil conductivity increasing from 0·2 to 4·1 blossom-end rot rose from 7·6 to 53·6%. The analysis of samples of unripe fruits from each plant, extracted in ethanol and ether, revealed increases of malonic acid ranging from 6 to 112 mg./100 g. fresh weight. The total acidity of the fruits and plant sap was not influenced by the soil conductivity and the moisture contents of internally necrotic and healthy fruits were equal.

On the basis of these findings a change in enzymatic activities, due to abnormally high soil and plant sap concentration, is postulated as the initial cause of blossom-end rot. The rate of malonic acid production exceeds that of its withdrawal, resulting in an accumulation. This acid is known to inhibit the activity of alkali-pyruvates, thereby decreasing the respiratory quotient of the plant cells. It is further suggested that the compound may decompose calcium pectate in the middle lamellae.

Ailsa Craig appears to be the most resistant to blossom-end rot of the varieties grown in Finland.

Walker (L. C.). **Foliage symptoms as indicators of potassium-deficient soils.**—*For. Sci.*, **2**, 2, pp. 113–120, 3 pl., 1956. [25 refs.]

Some of the information here on the use of indicator plants in conifer plantations has already been noted [**36**, p. 725]. In red maple (*Acer rubrum*) leaf chlorosis developed when the level of K was below 0·6% in mid Aug. The abnormal colouring of *Lupinus perennis*, *Trifolium pratense*, and *Spartium scoparium*, not attributable to K deficiency alone, is indicative of conditions which may cause stunted growth of the more demanding conifers.

Silverborg (S. B.) & Brandt (R. W.). **Association of Cytophoma pruinosa with dying Ash.**—*For. Sci.*, **3**, 1, pp. 75–78, 3 fig., 1957.

In New York State and other N.E. regions of U.S.A. dieback of white ash (*Fraxinus americana*) has been increasing in importance in the last 15 years. Some findings of a survey initiated in 1954 by the College of Forestry, Syracuse University, suggest that *C. pruinosa*, consistently isolated from a large number of trees, is a primary pathogen, viz. the pathogenicity of the fungus when inoculated into wounds; the development of typical dieback and cankers with pycnidia following such inoculation; and the reisolation of the fungus from these cankers. However, the fact that larger stems (4–6 in. d.b.h.) did not develop cankers after inoculation, and that symptoms sometimes appear after a reduction of diameter growth, probably attributable to an unfavourable environmental change, lends some support to the view that the fungus is a secondary invader, or perhaps pathogenic only to weakened trees. At all events the fungus is commonly associated with white ash trees exhibiting dieback, and appears to be an integral part of a disease complex.

Nichols (L. P.). **Hawthorn spraying in Pennsylvania with zineb.**—*Plant Dis. Reptr*, **42**, 5, p. 713, 1958.

At Pennsylvania State University leaf blight (*Fabraea maculata*) on hawthorn (*Crataegus* spp.) was successfully controlled by 2 or 4 applications of parzate or dithane Z-78 at 2 lb./100 gal.

Heybroek (H. M.). **Elm breeding in the Netherlands.**—*Silvae Genet.*, **6**, 3–4, pp. 112–117, 5 fig., 1 graph, 1 map, 1957. [Reprinted as *Meded. phytopath. Lab. Scholten* 16, 1957. German and French summaries.]

In this general account it is noted that *Ulmus pumila* and *U. wallichiana* are particularly susceptible to *Nectria cinnabarina* acting as a wound parasite [cf. **37**, p. 252], and that undamaged trees of the Christine Buisman elm (a var. from Spain) are also highly susceptible. Fast growth is often associated with susceptibility to

elm disease [*Ceratocystis ulmi*: loc. cit]. The resistance of seedlings, subsequently giving way to susceptibility as they begin to mature, complicates breeding.

Dutch Elm disease.—*Publ. Dep. Agric. Can. For. Biol. Div.* 1010, 12 pp., 9 fig., 1958. (Revision.)

This edition [cf. **31**, p. 523], largely re-written, contains new sections on the hosts of *Ceratocystis ulmi* [cf. **37**, p. 115], the insect carriers *Hylurgopinus rufipes* and *Scolytus multistriatus*, control, responsibility of the Dept of Agriculture for control, and the collection of samples.

Walters (N. E. M.). **Poria healeyi sp. nov. the causal fungus of yellow straw rot in Jarrah (Eucalyptus marginata Sm.).**—*Trans. Brit. mycol. Soc.*, **41**, 1, pp. 95–98, 1 pl., 2 fig., 1958.

In cultural studies at the Division of Forest Products, C.S.I.R.O., Australia, *P. healeyi* Walters from fallen logs of *E. marginata* in W. Australia [**17**, p. 148] was induced to form fruit bodies; these were identical with those of a *Poria* collected on a fallen *E. regnans* in E. Victoria. A reddish orange gum in the pores and context of young specimens darkens with age. The smooth, hyaline, elliptical to ovoid basidiospores are 3·5–5·5 × 3–4·5 μ. The apparent failure to form sporophores in the W. Australian forests is possibly due to the higher light intensity there than in the rain forest in the Tarra Valley National Park, where *P. healeyi* fruits readily.

In laboratory tests the fungus caused decay in *Pinus radiata* and *Nothofagus cunninghamii*.

Englerth (G. H.), Boyce (J. S.), & Roth (E. R.). **Longevity of Oak wilt fungus in Red Oak lumber.**—*For. Sci.*, **2**, 1, pp. 2–6, 1956.

This information on *Endoconidiophora* [*Ceratocystis*] *fagacearum* in Tennessee has already been noticed [**36**, p. 142].

Fritch (Kathleen C.), Schwarte (Mary K.), & McNabb (H. S.). **Observations on the effect of logging on the spread of Oak wilt in the Brayton Memorial Forest, Iowa.**—*Proc. Iowa Acad. Sci.*, **64**, pp. 110–112, 1957.

Observations made in 1951 in an area with oak wilt (*Endoconidiophora* [*Ceratocystis*] *fagacearum*) [**36**, p. 435] of long standing, not previously surveyed or treated, showed that an average of 5·89 trees/acre (0·739/yr.) had been killed by the disease in the last 8 years. In 1956 the average in plots where cutting out was started in 1952 was 0·71 trees/acre/yr., compared with 0·736 in non-cut plots. In 1955 doubling of wilt incidence was noted irrespective of different logging treatments, which were ineffective in controlling the spread of wilt.

Modugno-Pettinari (Carla). **Cycloconium sp. su alcuni esemplari della flora mediterranea sempreverde.** [*Cycloconium* sp. on some examples of the Mediterranean evergreen flora.]—*Boll. Staz. Pat. veg., Roma.* Ser. 3, **15** (*1957*), 1, pp. 139–155, 7 fig., 1958. [English summary.]

In Italy *Cycloconium querci-ilicis* [**37**, p. 78] was found on wild *Quercus ilex* growing near Massa, at Quercianella (Leghorn), at Castel Fusano (in the coastal area of Rome), and near Cassino, and on cultivated trees at Tivoli, Rome. Leaf lesions occur in very damp localities immediately after the earliest spring rains, continuing to appear until the end of autumn and, if warm weather persists, in the winter. The disease spreads rapidly by means of the conidia, which appear on the spots after a few weeks and frequently germinate on the same leaf. The pathogen usually attacks mature leaves, generally only on the upper surface. The fertile hyphae generally run over the leaf cuticle, bearing numerous round or slightly oval conidiophores arranged with the longer diam. parallel to the mother hypha. This, with

certain other characters, distinguishes the fungus from *C. oleaginum* on olive. The conidia average $18 \times 13 \mu$. Germination is good on peptone agar.

C. phillyreae [cf. **9**, p. 595] attacks all vars. of *Phillyrea variabilis*. It infects both surfaces of the leaf and may penetrate and kill the tissues. New infections are most frequent in autumn when the temperature is over 6–8°, but are also common in spring. The conidia average $25 \times 10{\cdot}5 \mu$, with a round basal cell and a pointed apical one. The fertile mycelium is usually subcuticular, only the globose conidiophores being present on the surface of the leaf.

On *Ligustrum vulgare*, *C. phillyreae* forms initial infections from late autumn to late spring. Only trees in very damp localities are affected. The spots are confined to the upper leaf surface, not more than 4 on any one leaf. The few conidia found measured $25 \times 9 \mu$. Germination was poor, even on peptone agar, the opt. temp. being about 18°. Both spp. were pathogenic on inoculation to olive.

Waterman (Alma M.). **Canker and dieback of Poplars caused by Dothichiza populea.**—*For. Sci.*, **3**, 2, pp. 175–183, 2 fig., 1957. [20 refs.]

D. populea, known in U.S.A. [**31**, p. 639] since 1915 as a parasite of a wide range of poplar spp., particularly *P. nigra* [var.] *italica* and spp. of the Tacamahaca and Aegieros group, causes extensive damage to young plantation trees, but has never been found on natural forest trees. Inoculations with *D. populea* on 92 clones representing 38 hybrids of black or balsam poplar with cottonwood showed that 75 clones were moderately or highly susceptible; trees of *P. deltoides* parentage were resistant. The use of disease-free stock for planting and the maintenance of best possible growing conditions are recommended in order to avoid infection among plantation trees. *Cenangium populneum* inoculated into selected clones caused no infection. Cultural studies failed to demonstrate any relationship between the two fungi.

Butin (H.). **Die jahreszeitlichen Wassergehaltsschwankungen und die Verteilung des Wassers in Stecklingen und im Stamm 2-jähriger Pappeln.** [Seasonal variations in water content and the distribution of water in cuttings and in the stem of 2-year-old Poplars.]—*Ber. dtsch. bot. Ges.*, **70**, 4, pp. 157–166, 3 graphs, 1957.

At the Institut für forstliche Mykologie und Holzschutz, Hann.-Münden, the water content of the stem in several poplar varieties was at a max. in May (cuttings) and June (2-yr. plants) and at a min. in Sept.-Oct. The observed seasonal susceptibility of poplar to *Dothichiza populea* [**36**, p. 674; **37**, p. 424] is in accord with these findings.

Honey fungus.—*Leafl. For. Comm., Lond.*, 6, (Revised), 6 pp., 4 fig., 1958. 1*s.* 3*d.*

This is a further revised edition of information on *Armillaria mellea*.

Redmond (D. R.). **Infection courts of butt-rotting fungi in Balsam Fir.**—*For. Sci.*, **3**, 1, pp. 15–21, 9 fig., 1957.

At the Forest Biology Laboratory, Fredericton, New Brunswick, in 1955, the roots of 18 *Abies balsamea* trees, 65–125 yr. old, heavily defoliated by budworm (*Choristoneura fumiferana*) for 5 successive years, but in the initial stage of recovery, were completely excavated for study. Surface wounds and wounds in root crotches were frequently (72%) the point of entry for root-rotting fungi, and 13% started in buried dead roots. *Armillaria mellea*, *Coniophora puteana*, *Corticium galactinum*, *Polyporus balsameus*, and *Stereum sanguinolentum* were isolated from decaying portions of roots [cf. **37**, p. 380]. It seems that dead roots are less important than dead tops in providing points of entry for decay. The incidence of butt decay in this sp. is very high, especially after 65 years.

Day (W. R.). **The distribution of mycelia in European Larch bark, in relation to the development of canker.**—*Forestry*, **31**, 1, pp. 63–86, 3 diag., 1958.

Studies by the Dept of Forestry, University of Oxford, have shown that living bark of European larch generally contains a microflora of fungi and bacteria, which may include *Trichoscyphella willkommii* [**37**, p. 320], and that necrotic (cankered) areas also contain such a microflora, including *Cytospora abietis*, *C. curreyi*, and *Coniothyrium fuckelii*, with *T. fuckelii* sometimes present, but not invariably, nor as the major constituent. Inoculation with these spp. in one area where canker is severe stimulated the extension of dead bark, but in another, more or less free from canker, caused little extension compared with the controls unless the trees were partially girdled. It appears that for the normal microflora of the bark to play a part in canker extension some special stimulus is needed, the condition of the tree probably being an important factor. Death of tissue occurs most usually in spring.

Risley (J. A.) & Silverborg (S. B.). **Stereum sanguinolentum on living Norway Spruce following pruning.**—*Phytopathology*, **48**, 6, pp. 337–338, 2 fig., 1958.

S. sanguinolentum [**37**, p. 382] was observed in 1956 causing a heart rot of 24-yr-old *Picea abies* near Alder Creek, New York [cf. **36**, p. 675]. Entry was through pruning wounds made 5 yr. before, and, in the 6 trees examined, caused 6·5–11 ft. vertical decay. Sometimes decay of both sapwood and heartwood had killed the tree.

Brennejzen (B.). **Niebezpieczeństwo zwiększenia szkód powodowanych przez skrętaka Sosnowego.** [The danger of increase of the damage by spindly shoot on Pines.]—*Las polski*, **31**, 2, pp. 7, 10, 1957. [Abs. from *Referat. Zh. Biol.*, *1958*, 5, p. 195, 1958.]

Investigations at the Scientific Forestry Research Institute, Poland, on the increased incidence of *Melampsora pinitorqua* on pine showed that nurseries must be established at a considerable distance from aspen and poplar trees or the leaves of these trees destroyed near the nurseries. Spraying with 1% Bordeaux or Californian mixtures every week from 15 May–15 June proved effective not only against *M. pinitorqua* but also against *Lophodermium pinastri*.

Batko (S.), Murray (J. S.), & Peace (T. R.). **Sclerophoma pithyophila associated with needle-cast of Pines and its connexion with Pullularia pullulans.**—*Trans. Brit. mycol. Soc.*, **41**, 1, pp. 126–128, 1 pl., 1958.

In 1955 Scots pine (*Pinus sylvestris*) in Norfolk suffered severe defoliation of the current year's needles by the pine gall midge (*Cecidomyia baeri*) in association with *S. pithyophila* [**36**, p. 793]. Infected material yielded cultures of *Pullularia pullulans*, which is possibly a state of *S. pithyophila*. No pycnidia of *Phoma acicola*, considered by some to be synonymous with *S. pithyophila*, were found; it occurs under different pathological circumstances and is common on dead or dying needles of Corsican pine (*Pinus nigra* [var.] *calabrica*) growing under unsuitable climatic conditions.

Graham (D. P.). **Results of some silvicultural tests in pole blight diseased White Pine stands.**—*J. For.*, **56**, 4, pp. 284–287, 2 graphs, 1958.

Observations on the effect of thinning and salvage cutting on the spread and intensity of white pine (*Pinus monticola*) pole blight [**37**, p. 321] in 3 areas in Washington suggested that thinning hastens stand deterioration if the disease occurs after treatment, pole blight being 2·6 times that in unthinned plots. The disease was not arrested by salvage cutting after its appearance.

Molnar (A. C.) & McMinn (R. G.). **The current status of pole blight in British Columbia.**—*Bi-m. Progr. Rep. For. Biol., Div. Dep. Agric. Can.*, **14**, 3, pp. 3–4, 1 graph, 1958.

Observations suggest that the recent lessening of intensification of pole blight on western white pine [*Pinus monticola*: **37**, p. 381], observed generally in B.C., notably the improvement in the foliage, was due to a change to a moister climatic cycle. Cutting of badly affected trees is, however, still advised, because they are subject to root rots.

McNabb (H. S.) & Shurtleff (M. C.). **Notes on stem rusts of hard Pines in Iowa.**—*Proc. Iowa Acad. Sci.*, **64**, pp. 187–188, 2 pl., 1957.

Cronartium comptoniae found on *Pinus montana* var. *mughus* in a nursery in 1955 and 1956 and *C. coleosporioides* on *P. ponderosa*, forming a nursery windbreak, in 1957 were new records for Iowa.

Moss (V. D.). **Acti-dione stove oil treatment of blister rust trunk cankers on reproduction and pole Western White Pine.**—*Plant Dis. Reptr*, **42**, 5, pp. 703–706, 1 fig., 1958.

In the Kaniksu National Forest, U.S.A., mycelium of *Cronartium ribicola* round partially excised trunk cankers on *Pinus monticola* was killed by application of 150 p.p.m. actidione in No 1 fuel oil [cf. **37**, pp. 189, 605] by a fog dispersing sprayer. The cankers were removed by a hatchet or knife, starting 1 in. (15-yr.-old trees) or 2 in. (30 yr.) above the outer limit of surface discoloration and extending downward along the visible canker margin to the proximal limit. The oil proved particularly suitable as a carrier for actidione, combining high penetrating capacity, slow evaporation, and good spreading properties, and was more satisfactory than sovaspray 100 [loc. cit.] or aqueous 2% glycerol.

Cafley (J. D.). **On White Pine blister rust in plantations in Ontario.**—*For. Chron.*, **34**, 1, pp. 57–61, 1958.

A survey of most of the white pine [*Pinus strobus*] plantations in Ontario from 1949 to 1956 showed that blister rust [*Cronartium ribicola*: cf. **37**, p. 321 *et passim*] is not a severe threat to young and middle-aged stands provided there is no *Ribes* near. Within the stands *Ribes* is eradicated naturally. In older plantations the rust may be dangerous if there is no closed crown cover. Recorded infections over the period ranged from 0·5–26·7% (near *Ribes*). Inspections of nursery stocks should continue.

Linzon (S. N.). **Water content variation in the heartwood of White Pine and its relation to incipient decay.**—*For. Chron.*, **34**, 1, pp. 48–49, 4 fig., 1958.

The heartwood of white pine [*Pinus strobus*] examined at the University of Toronto Forest, Dorset, Ontario, contained many irregularly shaped wet areas, which resembled incipient decay but were, in fact, sterile, though possibly a suitable medium for subsequent development of wood-decaying organisms.

Fenton (R. H.) & Berry (P. H.). **Red ring rot in Virginia Pine in Maryland.**—*J. For.*, **56**, 4, pp. 280–284, 4 fig., 1958.

Fomes pini is chiefly responsible for red ring rot of Virginia pine [*Pinus virginiana*] in Maryland, while *Polyporus schweinitzii* causes only negligible damage. The reddish coloration of incipient decay in newly sawn heartwood becomes white flecked in advanced decay; some 35% of the surface area of affected lumber was discoloured. In 382 sample logs sawn the disease caused under 2% loss, 85% of this being in trees 70–90 yr. old, but 15% showed incipient decay, which does not,

however, weaken the timber. The only reliable indication of the disease on standing trees is the sporophores.

Basham (J. T.). **Studies in forest pathology. XVII. The pathological deterioration of fire-killed Pine in the Missisagi region of Ontario.**—*Publ. Dep. Agric. Can. For. Biol. Div.* 1022, 38 pp., 16 fig., 2 diag., 12 graphs, 1 map, 1958.

This study [cf. **37**, p. 380] by the Southern Research Station, Maple, Ontario, of jack, red, and white pine [*Pinus banksiana*, *P. resinosa*, and *P. strobus*] after extensive fires in 1948 [cf. **27**, p. 342] showed that after 2 yr. considerable loss of merchantable timber results, especially from heart rot (mostly *Fomes pini*) and sap stain in fire-killed pine. The causal fungi and progress of the damage are tabulated. The 93·5% merchantable timber recoverable 2 yr. after the fire had fallen to 53·7% by 5 yr.

Foster (R. E.), Browne (J. E.), & Foster (A. T.). **Studies in forest pathology. XIX. Decay of Western Hemlock and Amabilis Fir in the Kitimat region of British Columbia.**—*Publ. Dep. Agric. Can. For. Biol. Div.* 1029, 37 pp., 2 pl., 10 graphs, 1 map, 1958.

This joint investigation on 496 living specimens of *Tsuga heterophylla* and 424 of *Abies amabilis* on 53 plots by the Forest Biology Lab., B.C. Forest Service, the Powell River Co., and Columbia Cellulose Co. Ltd., was aimed at evaluating the susceptibility to decay of the 2 spp. and estimating the hidden defects in mature forest. It was found that *A. amabilis* was infected throughout its range by *Echinodontium tinctorium* [cf. **35**, p. 56] which was responsible for more than 60% of the total decay in fir and could result in substantial loss of volume, but caused only 20% decay in hemlock. *Fomes pini* [cf. **37**, p. 382] was responsible for 13% of the decay in fir and 48% in hemlock but its incidence was irregular; it apparently attacks *Abies* spp. only infrequently in N. America. Less than 10% of the total infections were from root-rotting fungi.

Keithia disease of Thuja plicata.—*Leafl. For. Comm., Lond.*, 43, 6 pp., 3 col. fig., 1958. 1*s.* 3*d.*

This is a description of the *Didymascella thujina* disease of western red cedar (*T. plicata*) and northern white cedar (*T. occidentalis*), symptoms, damage in plantations and nurseries, and control.

Dzhafarov (A. A.). Представители грибов рода **Ganoderma** на реликтовых лесных древесных породах Талыша. [Representatives of fungi from the genus *Ganoderma* on relic tree species in Taluish.]—Изв. Акад. Наук Азерб. ССР [*Bull. Acad. Sci. Azerb. S.S.R.*], *1957*, 5, pp. 117–134, 1957. [Azerbaijan summary. Abs. from *Referat. Zh. Biol.*, *1958*, 6, p. 107, 1958.]

In the U.S.S.R. the genus *Ganoderma* is represented by 4 spp. and 2 forms, 1 of which has been described [cf. **36**, p. 670]. The characteristics of the genus, taxonomy, and a key are given.

Parmasto (E. K.). Развитие плодовых тел и споруляция трутовых грибов. [Development and spore discharge of the fruit bodies of pore fungi.]—*Eesti NSV Tead. Akad. Toimet., Tallin*, Ser. Biol., **7**, 2, pp. 83–93, 1958. [Estonian and English summaries.]

This expanded report of a paper presented at the 2nd Congress of the Pan-Soviet Botanical Society, May 1957, deals with observations in the Räpina district of Estonia in 1953–5, using an improved form of Bjønekaer's method [cf. **18**, p. 215].

A tin box containing a disk of shiny dark purple paper fixed to a piece of cork is attached by an elastic band to a nail or a wooden peg in the trunk of a tree 1–2 mm. under the hymenophore. The 56 spp. (220 specimens) examined fell into 3 biological groups. In (1) represented mainly by Porioideae, Tyromycetoideae, and Polyporoideae with annual fruit bodies, appearing in July or Aug., normal dimensions are reached in 1–2 (exceptionally 4) weeks, when development of the tube layers begins, and when they reach 0·5–1 mm. spore discharge starts, lasting usually 2–4 weeks, though in some species it may be longer (*Fibuloporia* [*Poria*] *mollusca* up to 5 months). The sporophores then rot away. In (2) the annual, wintering fruit bodies appear from June–Sept., as in many of the Corioloideae and some of the first two groups above. Autumn spore discharge begins 1–2 months later and continues until the temp. falls below 0 to +2° C. Many of the fruit bodies overwinter and resume spore discharge when the temp. rises above 2°, dying in early summer. Group (3), with perennial fruit bodies appearing from June or July to Sept., belong mainly to the Fomitoideae. There are 2 periods of spore discharge, summer-autumn and spring. In most species the fruit bodies are from 5–15 years old, though there are exceptions up to 65 years. As a rule they grow only in the summer. The species in groups (2) and (3) have their most abundant spore discharge either in spring during the thaw or in autumn before frost. Air moisture does not greatly affect spore discharge from woody fruit bodies on living trees, though in fleshy ones it may cause temporary lessening or even cessation.

Šarić-Sabadoš (Ana). **Prilog poznavanju mikoflore nekih Jugoslavenskih rudnika ugljena.** [Contribution to the study of the fungal flora in certain coal mines in Yugoslavia.]—*Acta bot. Croat.* (formerly *Acta bot., Zagreb*), **16**, pp. 113–127, 11 fig., 1957. [French summary.]

This report from the Faculty of Phytopathology, University of Zagreb, deals with some 40 spp. of fungi found on timber in coal mines. Some are widespread and dangerous, including *Poria vaillantii*, *Fomes annosus*, *Coniophora cerebella* [*C. puteana*], *Paxillus panuoides*, *Polystictus versicolor*, *Armillaria mellea*, *Lenzites betulina*, and *Stereum hirsutum*. These can cause a rapid and dangerous decay of props in 4–12 months.

Sakornbut (S. S.) & Balske (R. J.). **The effects of soil, moisture, and aeration variables in bioassay by the soil-block culture method.**—*For. Prod. J.*, **7**, 11, pp. 404–407, 1 fig., 1957.

At the Monsanto Chemical Co., St. Louis, Missouri, the activity of *Lentinus lepideus*, *Lenzites trabea*, and *Poria monticola* against ponderosa pine in soil block tests was greater with loose capping than when glass vent tubes were used [cf. **33**, p. 392], probably because of the better O supply, and possibly the more favourable moisture conditions. By use of krilium soil conditioner it was possible to add 40% moisture to Memphis silt loam without puddling and so to increase fungal activity.

Lohwag (K.). **Verkürzte Testungsmethode von bläuewidrigen Holzschutzmitteln.** [A shortened test method for anti-blueing wood preservatives.]—*Mitt. öst. Ges. Holzforsch.*, **9**, 1, p. 13, 1957.

In this rapid method in use at the Österr. Holzforschungsinstitut und Hochschule für Bodenkultur, Vienna, a small board (10×5×0·9 cm.), naturally infected by blueing fungi [cf. **31**, p. 94; **32**, p. 225] has a 3·5 cm. wide groove cut in its upper surface, in which the fungicide under test is painted. The board is then kept in a damp chamber for 3 weeks. With an effective fungicide the lack of fungal growth in the groove stands in clear contrast to the abundant growth over the rest of the board.

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